MINING CONGRESS JOURNAL

JUNE 1944

A JOURNAL for the ENTIRE MINING INDUSTRY

Published by the AMERICAN MINING CONGRESS

The same organization that produced the famed U. S. Royal Mining Machine and Locomotive Cables has given new proof of American resourcefulness. U. S. War Type Mining Machine and Locomotive Cables are admirably meeting today's emergency needs. Because they are made in the same plant, with the same equipment, to equally exacting standards of scientific skill, you can depend on them for satisfactory performance.

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MINING CONGRESS JOURNAL

VOLUME 30, NUMBER 6 FOR JUNE 1944

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★

Simple calculation shows that if every man, woman and child in the United States began the task of paying off the national indebtedness at the rate of one dollar a week, it would require forty years to retire the debt.

It would seem that Senator Byrd's Joint Committee on Non-Essential Federal Expenditures, already said to have saved some two billion dollars, not only has extremely rich ground to work, but should definitely earn the gratitude of every hard-pressed, tax-paying American.

★

FRONT COVER— Top: Cargo-Troop Carrying "Water Buffalos" in Practice Landings; Center: "Water Buffalo" and "Alligator" Tanks in the Invasion of Emirau; Bottom: Turret-Type and Carrying Type "Water Buffalos" in Training.—Official U. S. Navy Photos.

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress.

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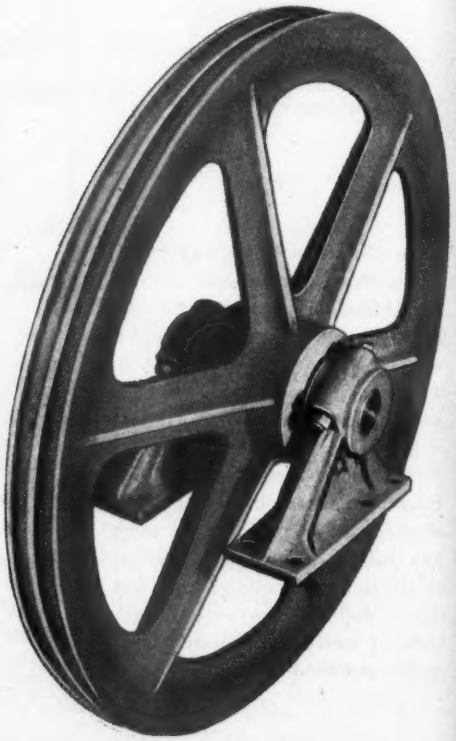
Three Points to Consider in Selecting SHEAVE WHEELS

1. Is the rim full machine turned in the groove for true running and saving of rope wear?
2. Are both Hub faces Machine turned for smooth, true running against the faces of the bearings?
3. Is the Wheel light, yet of strong section, to avoid undue bearing wear and to avoid high inertia which uses unnecessary power to start, stop and reverse?

HOLMES SHEAVE WHEELS are manufactured in both the bicycle type and the cast all-steel spoke type. Both are so designed to eliminate unnecessary weight yet exceedingly strong for long heavy-duty service. Holmes sheave wheels must pass the same rigid inspection as all other Holmes quality mining equipment before it is shipped.

Cast steel spoke wheels may be had for either single or double strand operation.



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ROBERT HOLMES AND BROS., INC.

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DESIGNERS AND FABRICATORS OF MINING EQUIPMENT FOR OVER 70 YEARS.


HOUR AFTER HOUR
PHILCO MINE LOCOMOTIVE
BATTERIES DELIVER
HIGH VOLTAGE
PHILCO Mine Locomotive Batteries pack an *extra wallop* not only when they're fresh from the charging racks, but throughout the entire working day. That's because Philco Batteries are engineered to deliver *high voltage* and keep right on delivering it hour after hour.
It's this sustained high voltage you get in a Philco that hauls more tons per shift . . . cuts haulage costs per ton . . . keeps the pit cars going at top speed. There's maximum capacity in a Philco, too—coupled with long productive life. Together these Philco features add up to the best battery you can buy for today's mining service.
For new equipment or replacements, get the facts on Philco Mine Locomotive Batteries!
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TYPICAL PHILCO MINE LOCOMOTIVE BATTERY MADE UP OF TYPE 25 AMA MONOBLOC UNITS
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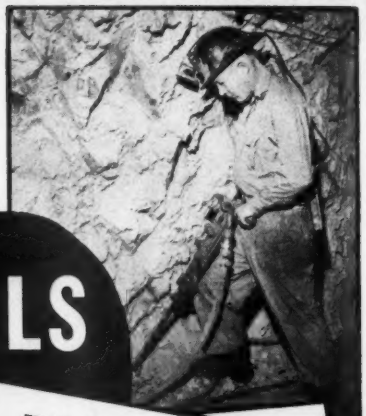


Thor ROCK DRILLS

"OUT-DRILL EVERYTHING ON THE JOB"

FROM A MAMMOTH PENNSYLVANIA ANTHRACITE PROPERTY*

"Thor Rock Drill was put through rugged stripping tests and out-drilled everything on the job, showing exceptionally powerful hole-blowing capacity by holding to steady drilling despite hitting three inches of clay every three or four feet."

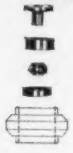
FROM AN ARIZONA DEVELOPMENT*

"Thor Rock Drill used in five different veins of varied texture and hardness showed such excellent results that runners took it apart to admire fine construction."

FROM A COLORADO OPERATOR*

"Thor Rock Drill drilled as deep as 25 feet in clay streaked conglomerate rock with amazing hole-cleaning power...out-drilled every other tool on every operation."

MINERS ARE *SOLD* ON THESE THOR PERFORMANCE AND MAINTENANCE FEATURES

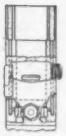


• LOW AIR CONSUMPTION

Thor Positive Short-Travel Tubular Valve uses effectively every ounce of air that enters the machine - - - measures air to a tolerance of .00025 of an inch!

• STEADY, FAST DRILLING

Extra-powerful rotation through extra sturdy rifle bar assembly and positive, non-slip ratchet action prevents stalling, even in heavy, sticky formations . . . full air power behind the piston gives the steel maximum forward and rotating power.

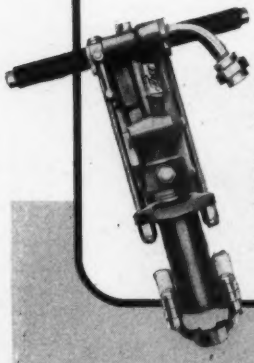


• AUTOMATIC LUBRICATION

On each reciprocation of the Thor piston hammer, oil is forced under pressure through a felt filter pad to keep every part of the machine constantly lubricated.

• OPERATING EASE

The Thor four-position throttle gives the operator complete control of drilling speeds for all operating conditions. Exclusive Thor spring retainer design provides quick, easy removal of the steel—provides longer life with fully enclosed springs that cannot clog or be over-tightened.



• POWERFUL HOLE-BLOWING

Thor air economy in turning every foot of air into power combines with powerful rotation to provide steady, maximum hole-cleaning ability.

Send today for complete information about Thor's wide range of light and heavy duty sinker, drifter and stoper rock drills and associated mining tools in Catalog 42-A.

Straight from the mines come these reports of Thor Rock Drills *out-drilling everything on the job* in all types of underground formations.

On-the-job tests like these are making Thor Rock Drills the popular choice of miners everywhere who *know* Thor performance . . . who *know* the low maintenance, smoother, faster handling made possible by Thor design and construction.

*Name furnished on request.

Thor Portable Pneumatic and Electric Tools

INDEPENDENT PNEUMATIC TOOL COMPANY

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Koppers Ar-moored Ties have a sawed-oak base, grooved to match the shape of a standard steel tie, pressure-creosoted to combat decay, then permanently anchored to the steel tie.

They minimize difficulties encountered with ordinary ties, such as lack of stability, spike-kill, corrosion from bottom moisture, tie-cutting in derailments, bending and distortion, and excessive maintenance.

Ar-moored ties can be quickly laid and quickly lifted. They can be re-used repeatedly as sections are worked out. Thousands have been installed, and experience very definitely indicates that these ties pay for themselves in a very short period. Their value today, when increased production calls for high-speed, high-capacity track, is greater than ever.

Ask for a copy of the new bulletin.

KOPPERS COMPANY—WOOD PRESERVING DIVISION
PITTSBURGH 19, PA.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

* Trade Mark

Princess Elkhorn Coal Company Operates 300 Timken Bearing Equipped Mine Cars . . .

This photograph was taken at the No. 1 Mine of the Princess Elkhorn Coal Company, David, Kentucky. It shows some of the 300 Enterprise mine cars equipped with Timken Bearings in service there.

These modern cars are of the stub axle type and carry approximately 3 tons of coal each. They were placed in service about 2 years ago and have given great satisfaction ever since.

The Princess Elkhorn No. 1 Mine produces 2,000 tons of coal per day. Another mine, designated No. 2, for which 100 new Timken Bearing Equipped cars have been ordered, has recently been opened in the same locality.

Thus, another satisfied user is added to the list of more than 1,000 mine operators who have proved it pays —over and over—to operate mine cars equipped with Timken Tapered Roller Bearings. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Increase

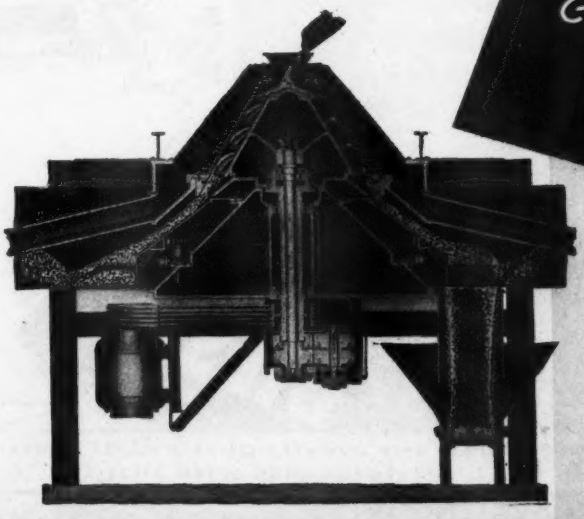
YOUR OUTPUT BY MAKING THE *fine* SIZES USABLE

★ The "C-M-I" Dryer may be so arranged that little or none of the finest sizes are lost as you economically dewater fine coals. Another arrangement provides for the disposal of the finely divided clay and ash particles with the effluent.

Sludge and slurry coals can, when reclaimed, be used for special purposes, or mixed with the larger sizes. The good carbon in the sludge may be dried and saved by use of a closed system.

• Takes little room — easy to install — increases output — saves money — conserves materials—power—time.

"C-M-I"
Continuous Centrifugal
DRYER



• The coal produced is dried to a non-freezing moisture content.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.
SECOND AND PRESIDENT STREETS ST. LOUIS MO

2300 RPM LATER

For many years, the excessive weight and bulk of cumbersome, slow speed models barred the door to low cost diesel power for many industries and countless types of equipment. But now—2300 RPM later—that barrier has been removed by the high speed diesel. In this trend toward higher horsepower output through higher engine speeds, the Cummins Dependable Diesel has consistently been the trail blazer—the leader. Every day sees this trend continuing . . . just as every day sees Cummins Diesel Power doing the toughest heavy-duty jobs at a lower cost . . . with greater profit.
CUMMINS ENGINE COMPANY, INC., Columbus, Ind.

CUMMINS *Dependable* DIESELS

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

HEAVY-DUTY MODELS FOR STRIPPING, HAULING, AND GENERATING SERVICE

Move Your Coal the Conveyor Way

GOODMAN CONVEYOR EQUIPMENT

Duckbills
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AT THE FACE

AT THE ROOM NECK

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GOODMAN MANUFACTURING COMPANY

HALSTED STREET AT 48TH • CHICAGO

SHEFFIELD
ALLOY STEEL
Grinding Balls
FORGED—HEAT-TREATED

GRIND TWICE AS MANY TONS PER BALL

Actual performance in mills in the United States and 14 other large countries throughout the world has universally proven that these balls wear longer, reduce power and lower the cost. They grind 50% to 70% more tons per ball than the average forged steel ball and 100% to 150% more than the average cast ball. It is not necessary to wait for postwar developments to cut your grinding costs.

Trademark Reg.

USE MOLY-COP BALLS

COPPER-MOLYBDENUM-ALLOY

(Fine Grained—Hard—Tough)

To Conserve Steel—Save Power—Increase Recovery of Metal

SHEFFIELD STEEL CORPORATION
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Guelph, Ontario, Canada

All Other Countries—
THE ARMCO INTERNATIONAL CORPORATION
Middletown, Ohio

1894-1944

Pioneers for 50 Years

For half a century, The Cleveland Pneumatic Tool Company has devoted itself to serving many major industries.* Skilled technicians and experienced engineers within our organization have pioneered and perfected many products for each of these fields. Thus initiative and resourcefulness have enabled us to keep abreast of this country's remarkable industrial progress . . . We are commemorating our golden anniversary by continuing to put all our talents and energies in the fight to preserve the American way of life. We are proud to have grown with our nation for 50 years, and look forward to serving in the great future that lies ahead.

**CLECO Pneumatic Tools speed production in metal-working plants. AEROLS (the shock absorbing landing gear used so universally on aircraft) insure safe, smooth landings and take-offs. CLEVELAND Rock Drills are widely used in the mining and contracting fields. CLE-AIR Shock Absorbers protect buses, trucks and trailers from road shocks.*

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AND SUBSIDIARIES

THE CLEVELAND ROCK DRILL DIVISION — CLEVELAND PNEUMATIC AEROL, INC.

CLEVELAND PNEUMATIC TOOL COMPANY OF CANADA, LTD.

SK motors never wear out

MORE WESTINGHOUSE SK MOTORS ARE USED IN COAL MINES THAN ALL OTHER MAKES COMBINED

AMPLE DESIGN—guts to carry the heavy loads—rigid one-piece frame with feet welded to frame to provide rigid integral foundation—uniform magnetic path aids commutation.

SPECIALLY DESIGNED INSULATION—field coils wound on rigid Micarta spool—vacuum-impregnated with hydrolene gum—eliminates air pockets. Mica-insulated armature coils—form-wound on all except the smaller ratings—protect against moisture or dust—prevent electrical breakdown.

EXCLUSIVE WESTINGHOUSE VESTIBULE SEAL—keeps lubricant in—dust and dirt out.

GREATER ACCESSIBILITY—Brushes, brushholders and commutator readily accessible—permits easy brush adjustment or renewal—brushes readily "sanded-in".

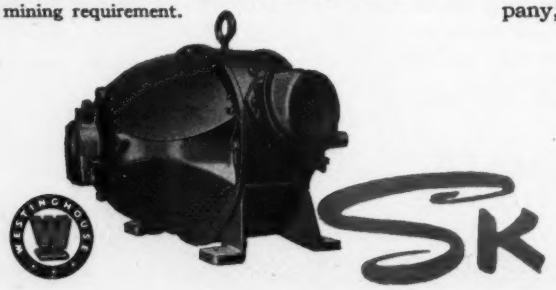
WIDE RANGE OF RATINGS—from 1 to 200 hp to meet every mining requirement.

You'll see them wherever you go—old veterans of 10—20—30 years service. SK Motors never seem to wear out. But, of course, they do. Like any other rotating machine, worn parts have to be replaced.

With SK Motors, however, parts can *always* be replaced. It makes no difference whether the motor was installed five years ago or thirty years ago. The basic construction of the Westinghouse SK Motor has never been changed. Parts made today for the latest improved design will fit any SK Motor ever built of the same rating and frame.

The Westinghouse SK Motor has been the standard for the mining industry since 1911. During the past thirty years it has been vastly improved—improvements you get in every new replacement part.

When you standardize on type SK Motors you automatically reduce and greatly simplify your replacement part requirements *and* you get the mining motor that leads all others. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. J-21302



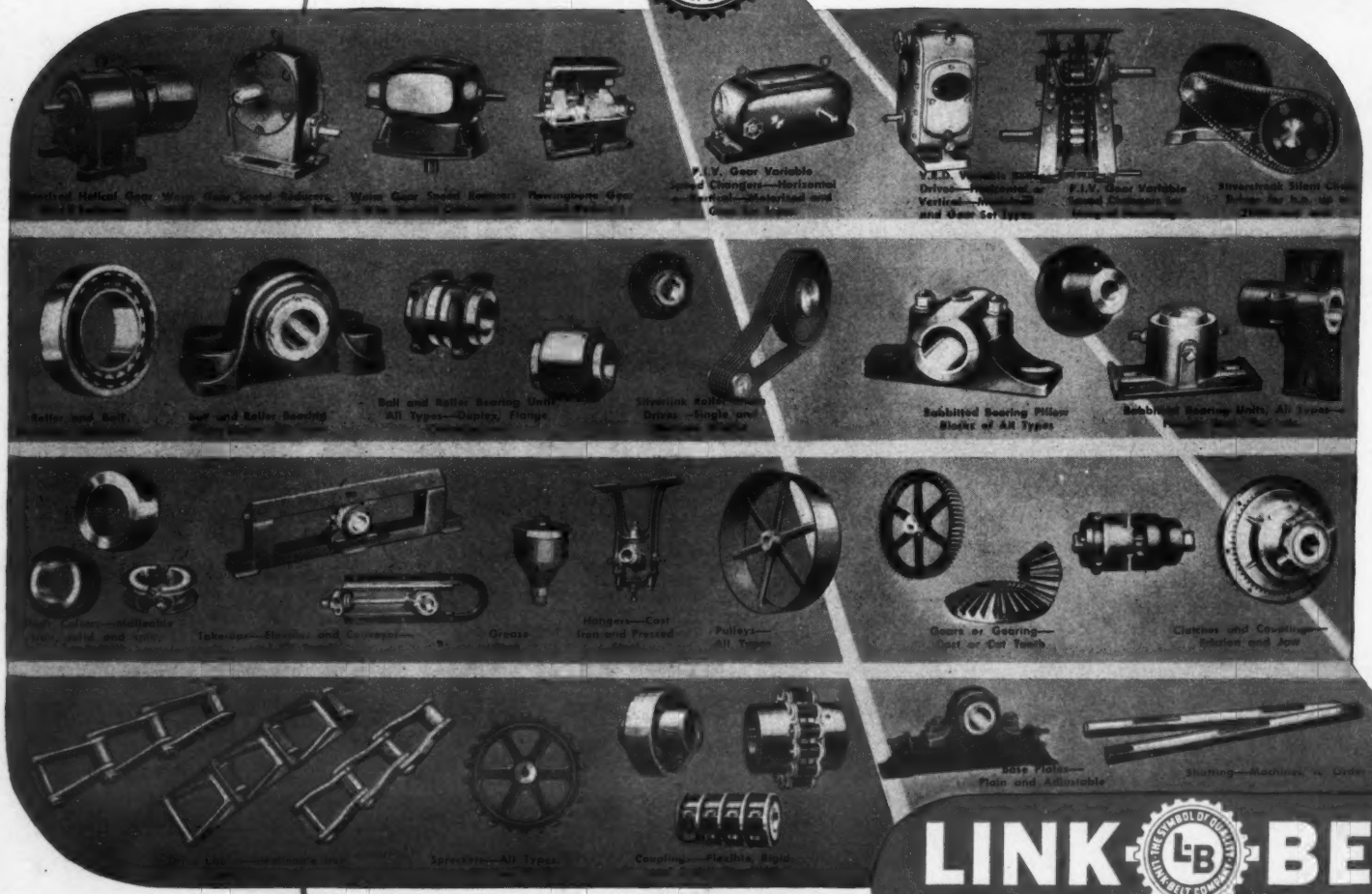
SK

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

MINING MOTORS

LINK-BELT OFFERS A COMPLETE POWER TRANSMISSION SERVICE



BUILDERS OF THE MOST COMPLETE LINE OF POWER TRANSMISSION MACHINERY

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Designed and Manufactured to Exceptionally High Standards of Efficiency and Long Life!

● Whether you need one or many of the different types of power transmission machinery shown here, you will find distinct advantages in securing them from a reliable, single source . . . LINK-BELT. A single standard, the highest, controls the engineering and manufacturing methods and operations . . . a single responsibility holds every detail to that high standard . . . and, an impartial recommendation assures the correct type and size to meet your requirements.

Thus, the name "Link-Belt" is synonymous with inherent quality, efficient production and long life in the power transmission equipment you require. Ask for catalogs giving full engineering and application data on any type of equipment shown. Begin now to increase the power transmission efficiency of your plant . . . let LINK-BELT help you! Address nearest office.

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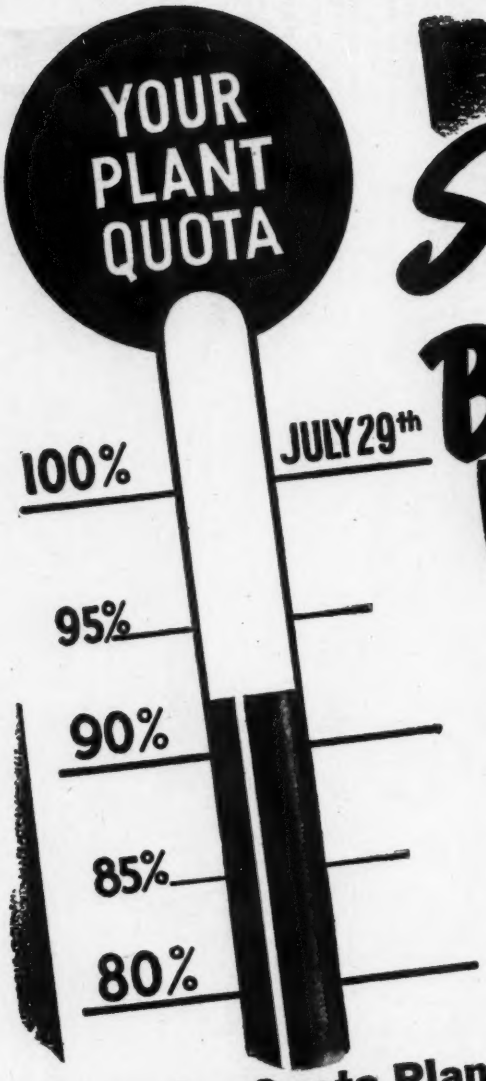
LINK-BELT
POWER TRANSMISSION MACHINERY



Stay at Your Battle Stations!

MANAGEMENT • LABOR

—the 5th War Loan Drive is still on.

July 29th is the last pay day in the Drive.

The U. S. Treasury has set the overall goal at $16,000,000,000 —$6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised!*

Keep fighting. The 5th War Loan is a crucial home front battle of tremendous importance to the total war effort.

Tighten up your 5th War Loan Drive organization. Step up your solicitation tempo. Drive! Drive!! Drive!!! Hit your Plant Quota's 100% mark with a bang that'll proclaim to all the world that the U. S. Home Front is solidly in back of the Fighting Front.

Need help? Need ideas? Call on the Chairman of your War Finance Committee. He's standing by.

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. Employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: **JOHN DOE MFG. CO.**—1,000 Employees

1,000 Employees x $100 . . $100,000 Cash Quota

Regular payroll deductions during the eight weekly payroll accounting periods of June and July. 30,000

$70,000 (to be raised by sales of extra Bonds).

BACK THE ATTACK—SELL MORE THAN BEFORE

The Treasury Department acknowledges with appreciation the publication of this message by

MINING CONGRESS JOURNAL

★ ★ *This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.* ★ ★

"I pick Sullivan . . . a fast driller with the best Rotation Release Control"

The S-91 Has the Exclusive Thumb-Flip Rotation Control

Conveniently located, easy to operate, instantaneous in action. Saves time, speeds drilling, increases footage.

The SA-91 Stoper

A short-length 42-inch Stoper weighing 90 lbs. for use in dog-hole drifts and low vein coal mines. 26-inch feed. 18 inch steel change.

The Famous Sullivan Safety Stoper

The self-supporting stoper that doesn't have to be held in position . . . prevents runaway, steel spin . . . speeds drilling . . . lessens wear.

The statement *made* above is the statement of the drill operator *shown* above . . . in one of the largest and most modern mines in the iron country. He tried "them all" and *he selected Sullivan.* The S-91 Stoper has many outstanding features. The exclusive dual valve means air economy yet insures the power to drive on through. The exclusive Sullivan thumb-flip control of rotation release means faster collaring and convenient, instantaneous rotation release when drilling in hard, broken or wet ground. The adjustable feed leg control gives any pressure between no feed and full feed. No wonder operators who have tried all stopers say the Sullivan S-91 stoper is the best. ...SULLIVAN MACHINERY CO., Michigan City, Indiana. *In Canada:* Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

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ROCK DRILLS • AIR COMPRESSORS • SCRAPER HAULERS • HOISTS • LOADERS • CORE DRILLS CONTRACT CORE DRILLING

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SULLIVAN

STOPERS . DRIFTERS . SINKERS

O-B Fused Trolley Tap Protection Works Two Ways---

SIMPLE, Fool-Proof Design---Only Four Major Parts

LIGHT WEIGHT and Easy To Handle--Weighs But Slightly More Than Two Pounds

LOW COST--Dimes Spent For Fused Tap Protection Save Many Dollars Of Expensive Cable Replacement

Safeguards Workmen Against Electrical Hazard

Protects Expensive, Hard-To-Get Cables From Burnout

Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

KEEP BUYING WAR BONDS

ARMY E NAVY

MANSFIELD PLANT

Write For Booklet 744M

READY AND WAITING

This Mack Model FC six-wheeler, with a capacity of 30 tons, is the largest standard truck built. It is especially adapted for use in quarries and strip mines, and for hauling of nickel, copper, iron and other ores.

THE post-war world won't be handed to us ready-made . . . but there will be a ready and waiting market for quarry and mining products. Housing, highways, perhaps new peacetime factories, dams and power-plants will keep supplier and builder busy for years.

Because of their proved ability to haul large tonnage at low cost, heavy duty motor trucks will have a vital part in this work, and far-sighted operators of modern mines are already giving close study to the selection of truck equipment best suited to their particular needs.

Plan *your* future operations now . . . with the advice of our engineers, men who know the job you face, and the kind of truck best fitted to do it. Address your inquiry to Public Works and Mines Division, Mack Trucks, Inc., 350 Fifth Ave., New York 1, New York.

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

Mack Trucks, Inc., Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

Uncle Sam

F-1 Crew 2-5-44

F-1 Coal Loading Crew At Isabella Hangs Up New Daily Mark Of 708 Tons

The F-1 crew Saturday established a new high mark for one loading machine at the Isabella mine of the Weirton Coal company by loading 708 tons of coal in one shift. The record was made in the 43 north pillar section and tops the record of 683 tons made January 11 by the C-3 crew in 62 south development section.

The new mark is believed not only a mine but a district record.

After establishing the record Saturday night members of the crew members of the crew were treated to a dinner in Dan Viega's restaurant in Republic. The record-breaking crew includes: Joseph Brown, loader operator; Donald Balsley, loader helper; Paul Cseko, motorman; Chester Glover, snapper; Anthony Stock, cutter; Carl Berardi, cutter; William Beggs, driller; Ralph McGraw, driller; Matthew Pitts, shotfirer; Mike Kobaly, timberman; John Warsack, timberman; August Cochin, timberman; Andy Russo, timberman; James May, timberman; Steve man; Carl May, timberman; Joe Walnisk Regish, trackman; trackman; Mike Knaplk, J trackman; Frank Skoda, track man; M. G. Shipley, foreman.

-from the Brownsville, Pa. Telegraph 2-7-44

★ It is accomplishments like these at the Isabella Mine of the Weirton Coal Co., Isabella, Pa. . . . achievements of fighting men on the production front . . . men with stamina and the will to win that makes America great.

F-2 Crew 2-5-44

Shown at left is one of the Whaley "Automats" at work on the rib line in the Isabella Mine where triple shift operation has proved successful.

MYERS-WHALEY

Mechanical Loaders Exclusively

—YOU'VE GOT FIGHTING MEN ON THE PRODUCTION FRONT AT ISABELLA . . . . .

Tonnage Record Is Established By Isabella Miners

Loading Machine Crew Hits 766-Ton Figure In One Shift

Records are made to be broken and that is just what one of the crews at the Isabella mine of the Weirton Coal company did for the second time on two successive days.

It all started last Friday when the F-2 crew established a new high mark for the 'F' pillar section, only to see this wiped out on Saturday by the F-1 crew, who not only broke the section record but also established a new high mine mark of 708 tons for one loading machine crew in one shift.

This greatly "peeved" the F-2 crew so they came right back again on the following shift and set a still higher mark of 766 tons. Members of the currently championship crew are:

Willie Pompey, timberman; George Ribarich, timberman; Charles Fowler, timberman; George Keffer, timberman; John Zajoc, timberman; Benjamin Smith, timberman; Martin Mehalik, trackman; James Cernelli, trackman; Joe Valkosak, trackman; Andrew Budinsky, trackman; Andy Strycula, cutter operator; Joseph Kosco, Jr., cutter helper; John Kosco, driller; Tony Milovich, driller; Joe Kanos, shot-firer; Andy Warsock, loader operator; George Payfor, loader helper; Thomas Glass, motorman; Bernard Zellers, snapper; Andy Rusen, bratticeman; Oscar Harvey, special timberman; Andrew Wellingham, special timberman; John Roberts, foreman.

Due to being short of men, Andy Rusen stayed over and worked a double shift, so was on both record crews.

-from the Uniontown, Pa. Herald-Standard 2-8-44

1930 TONS in ONE day, in ONE section, with ONE machine

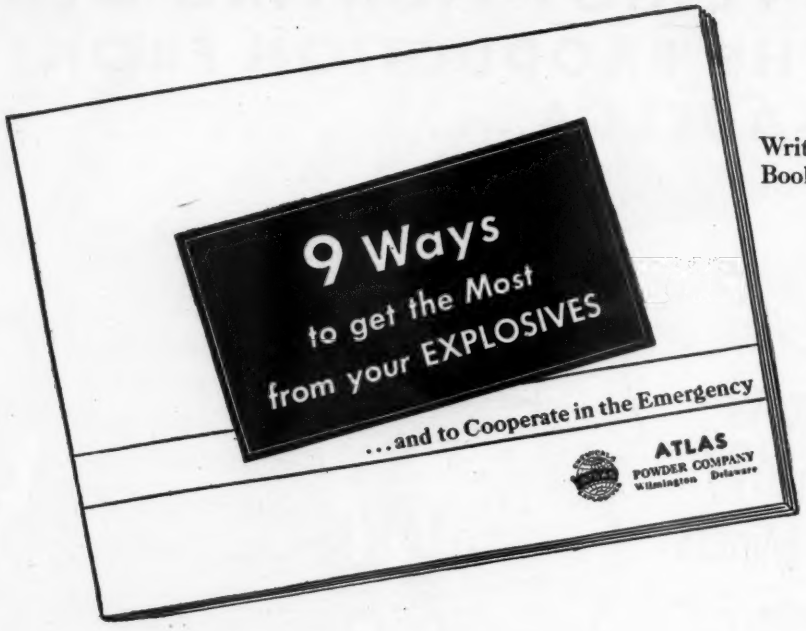
★ The tonnage from F. section, at Isabella, for Feb. 5, 1944 was: F-3 crew 456 tons, F-1 crew 708 tons, F-2 crew 766 tons. Total for the three shifts 1930 tons.

Triple shift operation at Isabella proves what good men, good management, and good machines can do.

Loading Coal on triple shift service is nothing new for the "Automats" at Isabella. These machines have long since proved their ability to take the punishment . . . get maximum production at minimum cost per ton of coal . . . at minimum maintenance, and with their single 25 H.P. motor, at lowest cost of power.

The Whaley "Automat" is a top production machine . . . don't overlook this. It is an all-purpose machine . . . built to load any material in the mine, be it coal, slate or rock. In addition, the Automats' vertical loading action shovel makes it the safest loader known. You should investigate the modern "Automat". Myers-Whaley Co., 144 Proctor Addn., Knoxville 6, Tennessee.

Over 35 Years



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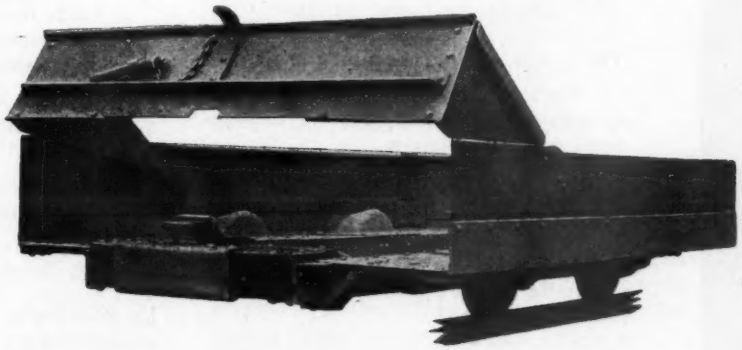

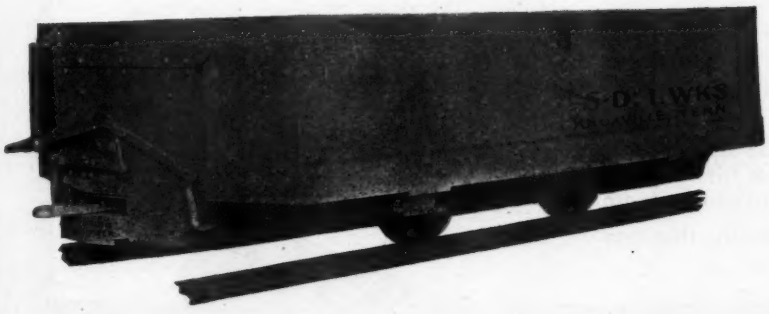

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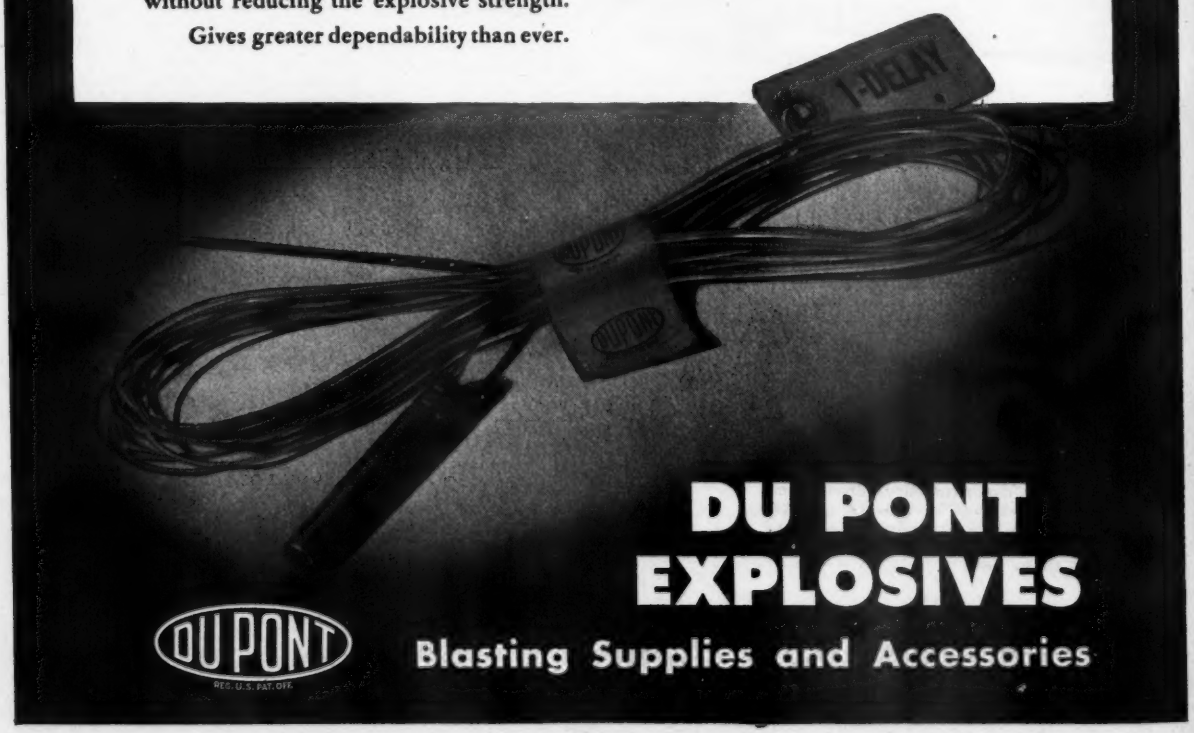

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MINING CONGRESS JOURNAL

Published for the Entire Mining Industry by The American Mining Congress

S. A. TRENGOVE, Editor

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Let's Encourage the Prospector

WE feel a little glow of professional pride whenever something really helpful shows up to aid in building and strengthening our great Western Mineral Empire. A number of things have come along from time to time to affect us in this manner, but the other day we received two new booklets which we thought were outstanding contributions. We refer to: "Industrial Minerals—Non-Metallics," and its companion piece: "War Minerals—Metals," offered by the Mining Committee of the Mining Division of the Los Angeles County Chamber of Commerce. These works undoubtedly fill a long-felt need, experienced by prospectors, mining operators and industrial plants, in showing data incident to finding and disposing of mineral deposits desired for our current economy.

The encouragement of prospecting is fully as conducive to the prosperity of the mining states as any other known force or potentiality. Under the protection of a general mining law designed to urge him on rather than deter him, the American prospector has gone into the hills, time and again, and discovered the rich orebodies which have become the very backbone of our nation in peace and war.

But, we constantly hear rumors of moves to rewrite the mineral land laws which now inspire our ore hunters. Some grant that small revisions might possibly be desirable but every true western miner agrees that the principal features should certainly not be tampered with. Secretary of Interior Ickes' recent reiteration that he is, "in favor of legislation authorizing the leasing of those minerals not named in the present leasing acts" finds us entirely without enthusiasm for a step which would utterly destroy the American prospector as we know him, and remove completely the unfailing incentives for ore-finding which he now possesses. We must combat every thesis of this nature with every means at our command if we are to remain a strong mineral producing nation.

If we don't, we may *actually* become ere long, one of the "have not" nations in mineral wealth simply because we will have destroyed our basic incentive for finding orebodies—adequate reward. If we are to stay on top, we must keep moving in a more positive direction and continue to encourage prospecting by every forward-looking method that our ingenuity may dictate.

Combating the Coal Shortage

PROJECTED to the year's end, the presently indicated deficiency in coal supplies of various types and quality for all purposes is to be some 30-odd million tons, unless the decisive defeat of our enemies reduces requirements substantially, and soon! In the battle to alleviate discomfort and tie-ups due to this situation three major forces are joined, and at work in the struggle against King Winter.

Leading the fight in the distribution field is Dr. C. J. Potter of the Solid Fuels Administration for War. His goal is an equitable share in available fuel for everyone. The new SFAW Area Advisory Committees, composed of established fuel distributors, should be of inestimable help toward reaching this objective, as they possess the data and experience from which to forecast where the fuel should go. They may not be able to offer everyone exactly the kind of fuel he wants, but they can play a big part in keeping everybody warm. The omission of coupon rationing alone should provide some relief to a public whose other rationing experiences haven't been too pleasant.

Secondly, the National Fuel Efficiency Council recently named by Dr. Sayers, Director of the U. S. Bureau of Mines, and embracing the talents of several thousand fuel experts, can furnish welcome aid through a fuel efficiency campaign already set up and under way. The result sought is a 29-million ton reduction in the annual commercial and industrial consumption of coal (and proportionate savings in other fuels). Action of this type presages real help for coal, both now and in struggles anticipated for it in the future.

The coal mines and their operating organizations constitute the third, or basic, force in the coal shortage campaign. They are doing a great job although suffering from important manpower losses and facing a discouragingly high rate of absenteeism. The most disheartening defeatist thrust we've heard recently along this line was that of a miners' official who opined that absenteeism wasn't causing any loss of coal because production figures were actually increasing! In answer to such illogical remarks, we pause only to advise that any increase in available man-hours should, on the basis of simple arithmetic, provide more coal. If the miners stay home, coal *is* lost.

The three great forces now aligned to combat the problems of coal shortage each have definite roles to fill. Miners, trained and skilled to perform tasks of which all too few men are capable, are therefore urged to put in every hour they can at their important jobs—and to discontinue listening to those who would have them believe that absenteeism isn't hurting production.

Planning For the Future of Coal Mining

The full range of factors and eventualities must be taken into consideration in order to guarantee the best possible future for coal

By D. L. McELROY

Chief Engineer
Consolidation Coal Company

THE coal industry's job today is to produce the coal necessary to keep both our war production and home front going at full speed and efficiency. In spite of labor shortages, absenteeism, slow deliveries on some materials and equipment, abnormal distribution and marketing problems; to date the coal industry has delivered that tonnage. If we continue to get support from those places where we have a right to expect it, the industry will continue to deliver the necessary tonnage.

Although the coal industry's first job is to produce the tonnage now needed, the industry would certainly be neglecting its obligations to the country, its stockholders, its employes and the thousands of miners in the Armed Forces if it does not plan ahead for the periods after the defeat of Germany and the defeat of Japan. The economic life of these United States is too closely aligned and too dependent upon the condition of the coal industry for us to blindly "free wheel" through the post-war years. With the best of plans efficiently executed, it will no doubt be rough enough for the coal industry and without some sensible sound planning, the "casualties" may be sufficient to shake the industry to its foundations. Assuming that there will be some sound planning on an industry-wide basis, it will be well for the individual company to remember the old adage, "The Lord helps them who help themselves."

Time is one of the most essential factors in making post-war plans. If we knew the dates that Germany and Japan would fall, the problem would be much simpler. There have been numerous guesses on such dates with a majority opinion that Germany will be defeated by 1945 and Japan, a year later. There is a tendency, however, among the experts to push back these dates. The best policy in making post-war plans would seem to be "too soon with too much" rather than "too late with too little." Certainly the coal industry is going to be immediately affected by any cutback in war production, even with the most skillfully executed plans for conversion to civilian production. The effects of such cutbacks will be felt in different degrees by the various coal fields, districts and companies.

For best results an organized program with fixed responsibility is essential for the industry as a whole, for each coal district and each company. The results are going to be in proportion to the time, ability and energy expended on the job.

I believe it will be best and logical to plan on "hard times" for one to three years after the "shooting war" is over. The uncertainty of economic conditions, due to reduction in war production, and increase in unemployment can very easily neutralize the inflation force of the large savings accumulated by the general public. Some authorities estimate unemployment will reach 12 to 18 million persons by 1945 and 1946. The test of post-war plans will be the ability to weather this period. A close watch on employment and business indexes, particularly in our production and market areas, may give the all-important "storm warning."

A good many experts say we will have at least three more years of price control, assuming the war will be over by the end of 1945. In connection with price control, I will simply raise the question as to the future of such legislation as the now defunct Guffey Act. There is quite a difference of opinion in the industry as to the answer to that question.

There is also the distinct possibility, if not probability, of government control over materials for some time after the war is over. If, as some claim, critical materials and equipment are released on the basis of the ratio of labor costs to capital and materials used, the coal industry should be in a good position from a production standpoint; but some coal markets in particular may be adversely affected. There is, however, a distinct opinion on the part of many persons that the material shortage, with some few exceptions, is more a topic of conversation than a matter of fact.

How much we should plan on a more conservative political atmosphere in the next few years is a matter of personal opinion. Some indication of any change should be available before the end of the year.

Our planning should carry from the working face to the customer in order to do the most efficient job under the most adverse conditions we can reasonably expect. For the remainder of this discussion there are outlined some of the things we should do and some we might do in planning for the post-war period in the coal industry. They will be discussed under four headings: Markets, Mines, Manpower, and Money.

Markets

After a thorough check of pre-war distribution of coal, as well as distribution during the war period, post-war sales should be projected as accurately as possible. Projection of these post-war sales should, of course, be conservative. It is important for any company to know whether their share of the coal business has increased or decreased since the war started, as well as to know the changes in distribution which have taken place with their coal and why. Certainly a year such as 1938 would be a conservative basis for such plans.

A very important factor is to determine how many of our war markets will carry into the post-war period. This is particularly important in regard to Government-owned plants inasmuch as their future is quite doubtful. It is quite important to decide what can and should be done about any pre-war markets that had to be dropped, due to the pressure of war needs. It is apparent that any information obtained concerning the post-war plans of coal consumers would be very helpful in making post-war plans for coal distribution.

For many companies an important factor will be an accurate appraisal of how much coal business acquired due to oil conversions can be kept

after the war is over. Although some persons in the coal industry are optimistic concerning these converted markets, it is entirely possible that free and easy imports of oil may not only recover the markets for oil lost on the Eastern seaboard, but may even move oil inland through the pipelines which have been constructed for eastbound shipments of oil during the war. A thorough knowledge of the future competition to expect in the fields of waterpower, oil, and gas, will be necessary in projecting future sales. Hand in hand with this information is the determination of the various sales outlets available to our coal and what type of service these outlets will require in order to secure their post-war tonnage. For several years after the war, the present indications are that we will have a period of low tariffs. The direct effect on coal should be negligible, but the effect in some consuming markets may be quite important. As, for example, low tariff on imported oil. There will probably be some increase in export coal for a short period after the war, which may be important to some individual producers but will have little effect on the industry as a whole.

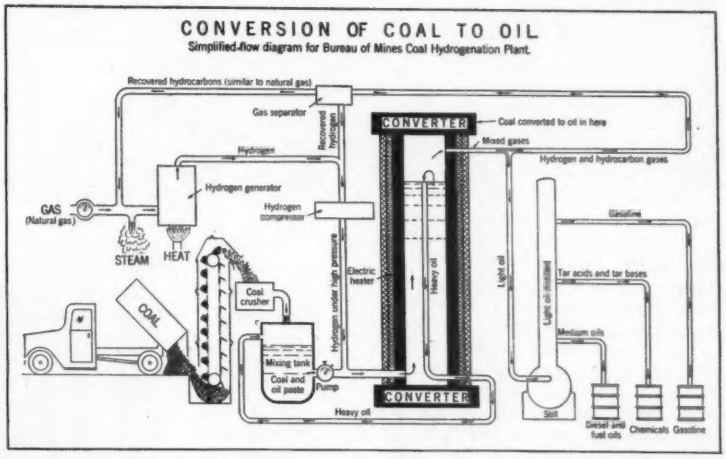
A great deal is heard concerning new uses for coal, such as the chemical industry and synthetic oil production. The tonnage consumed in the immediate future by these markets will probably be relatively small on an industry-wide basis but can, of course, be quite important to some companies and to some districts. The markets of some districts may be influenced to some extent by geographical shifts in the location of population and industries after the war.

The all-important thing is to put our major efforts on those markets available to us that will give the best overall return, keeping in mind our operating problems and the types of coal we produce.

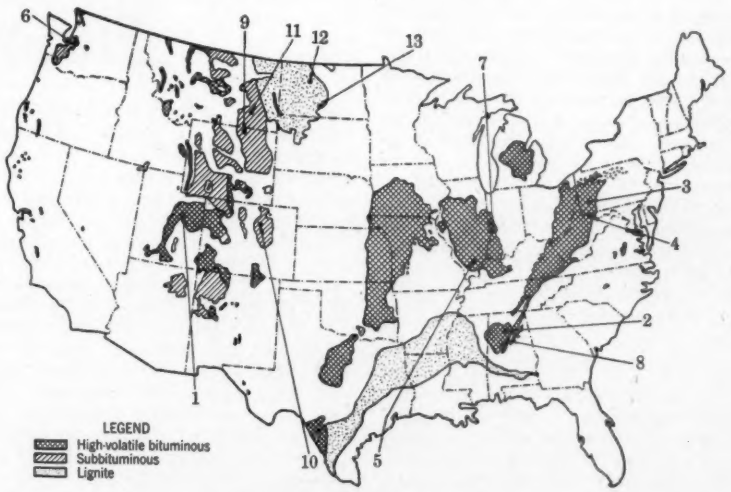
Mines

In spite of a very serious labor shortage, *every effort* should be made to get the mines and plants into the best possible condition that labor and material supply will permit. The more a mine is run down during the war period, the more difficult it will be for that mine to get in proper condition to operate efficiently. Following the war we all know that competition will again be keen and that efficiency of operation will probably be the most important factor in determining the ability of that mine to operate at a profit. This matter is not only of importance to the stockholders, but also to the employes and the community in which the mine is located. In some instances it may even require the loss of some production during the war to keep a mine in proper operating condition. The loss of some tonnage for this reason is justified if production of the near future is endangered by the mine conditions. Many mines have neglected needed work for maintaining normal safety and good mining conditions. We all know that some mines have been mining the best quality and easier mined coal due to war demands, and some of these mines are now in a position where proper maintenance of the property can no longer be deferred without seriously jeopardizing production in the near future. The most important thing, I believe, is the mines. After all, you can't do anything unless you have coal produced.

Based on the economics of production and probable market specifications, the post-war tonnage of each mine should be established and the mine projected on the basis of these factors. The method of working each mine and the equipment for each mine should be decided upon for at least the next five-year period. This means that we must decide which methods and equipment to scrap, which to alter, and which will remain satisfactory. It is probable that immediately after



The tonnage of coal to be consumed in future synthetic oil production may be small but yet quite important in some districts



How much gasoline will coal produce on hydrogenation?

Number	Bed or mine	Nearby City	Gallons of gasoline per ton of coal
1	Lower Sunnyside	Price, Utah	136
2	Black Creek	Birmingham, Ala.	134
3	Pittsburgh	Pittsburgh, Pa.	130
4	Upper Freeport	Morgantown, W. Va.	126
5	Illinois No. 6	West Frankfort, Ill.	122
6	McKay	Seattle, Wash.	120
7	Indiana No. 4	Terre Haute, Ind.	112
8	Mary Lee	Birmingham, Ala.	105
9	Monarch	Sheridan, Wyo.	100
10	Puritan Mine	Greeley, Colo.	91
11	Rosebud	Forsythe, Mont.	81
12	Coteau	Minot, N. Dak.	65
13	Knife River Mine	Bismarck, N. Dak.	63

Yields from coals tested in Bureau of Mines hydrogenation plant.

Diagrams courtesy A. C. Fieldner, U. S. Bureau of Mines.

the war obsolescence will play a very important part in determining mining equipment needs, as it will in practically all industries.

Every effort should be made to obtain as complete information as possible on the future plans and machinery designs of the mining machinery manufacturers. The manufacturers owe this information to the only customers who can carry them through the post-war period. A lack of information, however, is no excuse for failure to take advantage of improved equipment now available.

In laying out future mine projections and equipment programs, such things as portal-to-portal pay, safety conditions, and working conditions should be borne in mind due to the effect on labor problems.

Now is the time to decide on the basis of reduced post-war production demands, whether mines will be cut back in production and how much, whether all mines will work a partial workweek, or whether mines will be closed down to meet reduced production needs. Such decisions must be made on the basis of individual efficiency and markets of the various mines. Assuming that the industry will return to a 35-hour workweek after the war, production requirements must be coordinated on the basis of a five-day workweek, or a six-day workweek with staggered crews. Also, before any future plans can be made for any mine, the question of single, double, or triple shift work must be answered.

Before any of this planning can be done, it is important to know the full details of performance and cost at each mine for each type of production unit under the conditions which they now work in comparison with future conditions, so far as they can be determined. As this information is acquired, it will be possible to set up standards of work which should, of course, be continuously reviewed to keep them up to date. Such a study should enable a company to standardize and simplify to the maximum their future methods, equipment, materials, and work procedure.

Manpower

In all future planning one of the most important factors to keep in mind is that the coal industry spends more money for labor than any other item that enters into the cost of coal. The cost of labor has risen sharply and the coal miner receives an hourly rate comparable or better than employes receive in other major industries of the country. Therefore, the industry has every reason to expect the very best labor available, and for such a competitive industry as coal, the best is none too good. Therefore, the future of any property depends to a major degree upon getting value received for money spent for labor.

Present labor shortage should not lead us to jump into an opening labor market and get our mines loaded with undesirable layoffs of other plants or industries. Extreme care in employing new personnel should be exercised at the time the shift occurs in the labor balance.

The future plans of any mine should certainly include the determination of how many men will be required for the projected tonnage and system of mining as well as the various types of work to be performed and the qualifications of the men to perform it. Training programs will be necessary and now is the time to outline them, and in many cases, now is the time to inaugurate them.

No company can overlook the requirements of the draft law, as it relates to the rehiring of employes now in the Armed Services. All companies have a large number of former employes in the services, and certainly a good number of them will be back for their old jobs. I believe that most companies will welcome back a vast majority of these young men. There is no doubt but what there will be discharged from the Armed Forces a great number of these younger men, many of whom will have received valuable training along mechanical lines, as well as a system of discipline and working that should make them adaptable to mechanical mining in particular. It must be remembered, however, that many of these men will have to make a major adjustment in their way of living and that the industry cannot expect this adjustment to be made over night.

Government plans are already made for the vocational training of discharged soldiers, and where such training will be of value to coal miners now in the services and to the type of work they will probably do, they should be encouraged to take advantage of such training.

Future mechanization, which is inevitable, will tend to reduce the total number of employes on the pay roll and the benefits of such reductions must be balanced with the cost of unemployment compensation. This problem will vary with various coal producing districts and various companies. It is assumed that each company is thoroughly familiar with the procedure under which unemployment compensation is operated in their states. This is particularly important in those states where rates are based on the Merit System. Where the Merit System is in effect, a record of good employment is a distinct help. Labor turnover is also an important factor affecting unemployment compensation rates, and it is, therefore, well to keep in mind that labor turnover is based more or less on working and living conditions. This is particularly true if the industry is going to secure the type of manpower it needs and to which it is entitled as the basis of its wage scales.

Some authorities believe that there will be a legal restriction in layoffs in the post-war period. Some of these authorities speak in terms of only permitting a layoff of 10 percent of the working force. The effect of such legal restrictions is obvious and future planning should keep this possibility in mind. Also, there is a possibility (or even a probability) that industry will be required to pay separation wages.

The number of skilled miners available is of great importance to the future of coal mining

Since Congress feels considerable responsibility to regulate the readjustment of employment from war to civilian production, the coal industry must continue to keep a close watch on labor legislation. A thorough review and study of the labor relations and labor regulations so far in the war period may be helpful in making future plans.

If post-war periods of the past mean anything—and I believe they do—we will probably see considerable labor unrest after the war. As unemployment increases, it is only natural that organized labor will strive for provisions in their contracts that will tend to maintain the maximum

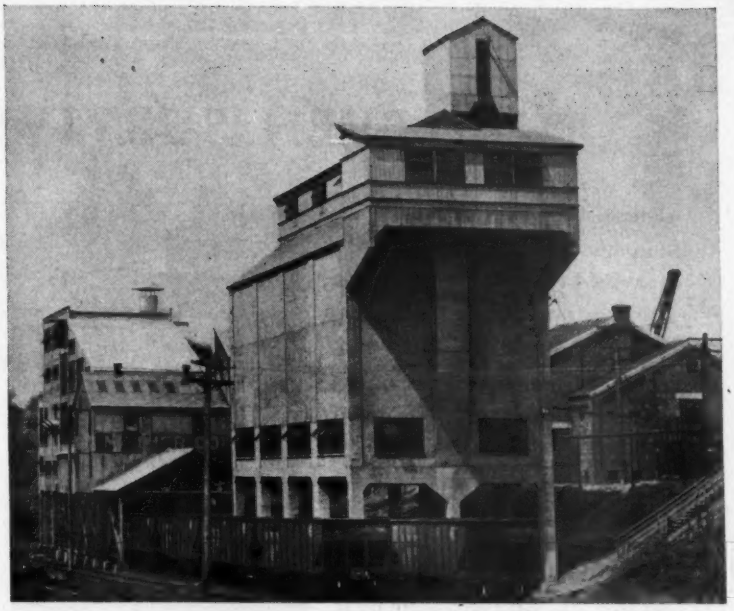
number of persons on the pay rolls. Such policies can lead to considerable "feather-bedding." Some labor authorities believe there is a possibility of the United States following the policy of some European nations in tying up labor rates with the cost of living index. The same authorities believe that all unions will campaign for a guaranteed annual wage, and cite the United Mine Workers of America as an example, based on facts brought out in the last two wage negotiations. The effect of the payment of a guaranteed annual wage on an industry as seasonal as the coal industry, is obvious. Such guaranteed wages would certainly be a heavy burden for the coal industry under normal operating and marketing procedures. It is not likely that there will be any consequential swing to non-union operation. Certainly the miners are as well organized as any major labor group, and in addition, are now much better protected by law than they were after the last war. There is, however, the distinct possibility that Government support of union activities in the post-war period may not be so active as it has been during the past decade.

There is little doubt but what the coal industry is rapidly becoming an industry of skilled labor and will continue in this direction. Despite the opinion of a good part of the American people that the coal miner is inferior to the average American laborer, those of us in the industry know that this is not the fact. The coal miner is as intelligent, ingenius and probably more self-reliant than any other group of American labor. With this labor as a base, properly trained for the technical problems ahead in the coal industry, and a mutual understanding of our mutual responsibilities in making a healthy post-war coal industry, our future labor problems can be satisfactorily solved.

Let me repeat again that we buy more labor than anything else in the coal industry, and our future depends upon our ability to handle the labor problems of the future.

Money

A study of authoritative comments in regard to post-war economics shows, as usual, considerable diversity of opinion. Some of these authorities predict inflation, due to the release of war-time savings and the pent-up material needs of the people. Other authorities predict a period of deflation, due to the uncertainties of the future in the minds of the people. Each individual company must decide which way the trend will be and plan accordingly, although it would be well to have plans for both possibilities.

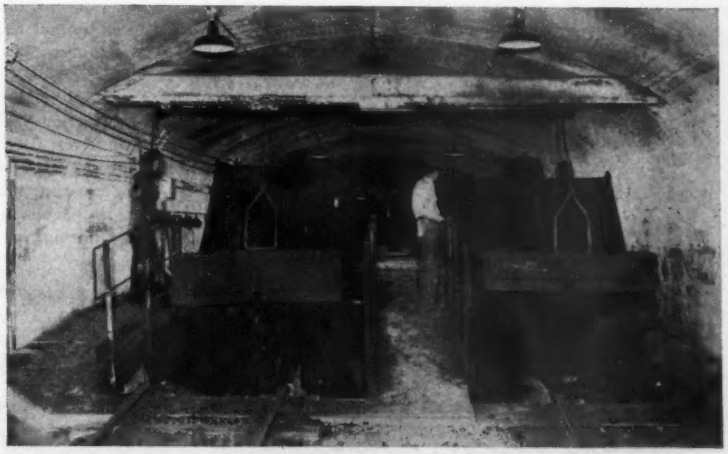


The industry's numerous preparation plants will carry important roles in the future story of coal

Due to the fact that technical obsolescence always increases after a war, some plans should be made to finance the scrapping of old equipment and acquiring new, where the efficiency of new equipment will save money. Due to the uncertainty of future markets and future coal prices, it would seem to be well to plan conservatively in regard to financial reserves. Based on recent treatment by OPA, so long as they control prices, we cannot expect a proportionate rise in the price of coal compared to the rise in price of labor and materials. Although a post-war period usually is a drain on cash reserves, this fact is not so serious provided the cash reserves are available and full value is obtained for the money spent. In counting on a 10 percent excess profits tax refund, it probably will be best not to plan on these refunds for at least one year after the defeat of Japan.

In the post-war period there is not much doubt that there will be a premium on any industry or company being in a reasonably liquid condition. The best plans for the period after the war will be worthless if there is no ability to finance them.

Certainly the future of the industry and any company will depend upon its management. In spite of outside influences, many of which are formidable and important, management must accept its responsibility for the future of the industry.



Special equipment will continually be introduced in the extraction and handling of coal

THEY EVEN SURVIVE WRECKS

Edison Alkaline Batteries in mine locomotives and shuttle cars have survived so many wrecks with little or no damage — and then have gone on to deliver full service life — that maintenance men no longer are apt to get excited when they see damaged trays of cells come into the shop.

They usually just test, reassemble, and send out again. They *expect* them to stand up simply because they have seen them do it so often, and have learned that the steel cell construction of alkaline batteries has no equal for rugged strength.

Yet their durable mechanical construction is only one of a number of reasons why alkaline batteries are dependable, economical power units. They can be fully charged in 6 to 7 hours direct from the d-c. power supply; do not require critical rate regulation; give longer life than any other type of battery; can be laid up indefinitely without injury; can be ventilated rapidly for high-temperature operation, yet are not damaged by freezing.

Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.

LOCOMOTIVE FALLS 170 FEET;
BATTERY STILL TESTS O. K.

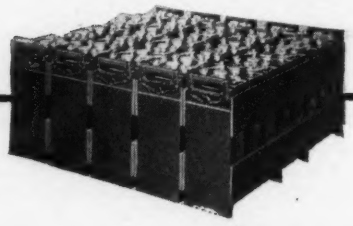
A worker was unloading steel near the top of a mine shaft. A trammer was in the way. He did not know how to move it but he saw the controller handle and shoved it on.

The trammer headed for the shaft, smashed through the gate, fell down the shaft, and stopped just above the 200 level, a drop of 170 feet.

The alkaline battery in the trammer required a few external repairs but all the cells tested O. K. so it was returned to service. It was then five years old. It later delivered an additional eight years of service.

The fact that alkaline batteries can withstand such accidents, illustrates the extra dependability that they deliver under more normal conditions.

TYPICAL 40-CELL BATTERY FOR SMALL TRAMMER



Edison
ALKALINE BATTERIES

Digest of Papers

THE 1944 Coal Mine War Conference of the American Mining Congress was an outstanding success from all angles—and especially from the standpoint of practical operating information presented. The future of the coal mining industry is so completely bound up with the proper solutions to its many operating problems that it behooves every coal mine official and every mining machinery manufacturer not only to avail himself of the knowledge and ideas of others, but also to contribute to coal mining progress wholeheartedly from his own findings and experiences. The digests of Coal Conference papers presented herewith offer a broad coverage of the present and approaching issues which the coal industry must face.

Bituminous Research

The Search for Improved Utilization of Coal Must Continue if It is to Retain or Improve Its Economic Position

By CHAS. B. BATON
Geo. S. Baton & Co.

DESPITE all the publicity about the short life of fuel oil and natural gas reserves, we expect this keen competition to coal to continue. We must prepare to face the rivalry of oil, natural gas and hydro-electric power.

What advantages have these competitors to offer? First is lack of ash. Ash in coal is a most serious drawback. It is difficult to handle in burning equipment, causes abrasion, must be transported from mine to consumer, and must be disposed of. Next is lack of smoke. Our competitors do not produce obnoxious smoke.

Railroad fuel consumes approximately one-fourth of all the coal produced. Railroads find, however, that diesel power has many advantages. The overall thermal efficiency of the coal-fired steam locomotive is 6 percent, the diesel 24 percent. Thus diesel fuel for locomotives is actually cheaper than coal. Today, at least one-half the locomotives being built are diesels. However, if the efficiency of the steam locomotive could be raised from 6 percent to 9 percent there would be no fuel savings in diesels. We must improve the locomotive—by operating water-tube boilers at a high pressure or possibly by turbine electric locomotives. The improved thermo practice of electric generating plants would be put on wheels to develop a modern locomotive.

Oil has completely defeated coal in the Navy and Merchant Marines; it is easier to store on boats and can produce eight times as much available heat per equivalent combustion space. In domestic heating, oil is convenient and smokeless, furnace takes up little room and storage tank is outside.

Industrial gas is usually sold at a price to compete directly with coal, whereas domestic gas is sold at a very high price because it is the ideal domestic fuel. It is clean, takes up little room, no storage is involved and it is absolutely automatic.

Water power is growing tremendously in this country. Under the guise of flood control and navigation, much of the cost of installation is hidden, but if the actual figures were available there would be very few localities in our country where coal cannot produce cheaper power.

On a B.T.U. basis, coal is the cheapest source of energy. With coal at $2.50, 100,000 B.T.U.'s cost about 1 cent. With oil at 5 cents, 100,000 B.T.U.'s cost 3⅓ cents. Another advantage is that there is lots of coal and it is much better distributed than any other source of energy. With these advantages we can face the future confidently if we look to the customer for his needs and his wants, to decide how we can meet these better or at least more economically than the competing fuels. First, we must learn how to handle ash conveniently and cleanly. Next, coal must be made cleaner. One of the objections to coal is the dust and the dirt it makes in a home. Third, soft coal must be burned without smoke. People are burning the other fuels because they are clean and automatic. It is popular to eliminate smoke and we can be sure that the politicians will seize the opportunity to please the public. An improved air jet has been developed for locomotive use, which will eliminate smoke at a very low cost. There is no reason that this cannot be installed on other equipment.

Our next great disadvantage is lack of convenience in burning coal. It cannot be handled as conveniently as liquid or gaseous fuels. Another problem is the cost and space needed to store coal, and to discard ashes.

Lately, Bituminous Coal Research has been developing the field of domestic heat and small boilers which consume about one-fifth of the nation's coal production. B.C.R. has also sponsored development of a smokeless stove which is hand-fired. Battelle Memorial Institute has designed a residential stoker, which is now under development by a large manufacturer.

The coal industry will some day be the major source of fuel gas. Coal can be converted into gas completely except for the ash, and the gas piped where it is needed. This gas can be used for the manufacture of many chemical products. To compete with natural gas, the complete gasification of coal must be as simple as possible and must use the coals available at low cost. There is not enough high-grade by-product coal available so our gas manufacturer must be able to use lower grades of coal; B.C.R. has experiments under way to develop a new method. They are also working on year-round air-conditioning, by use of coal, an entirely new field. They have proven that pulverized coal can be applied to any size of forge furnace—a metallurgical and ceramics market that has been completely dominated by fuel oil.

Oil-fired gas turbines show a possibility of efficiency equal to the diesel motor. If turbines can be operated on a powdered fuel, it gives us an efficient motor that is a direct competitor of the internal combustion motor.

At Penn State College, the main work has been to establish a convenient automatic stoker. A good deal of work has also been done on the chemical use of coal. They have developed a liquid coal and are now working on plastics, dyes and other chemicals direct from coal instead of by-products. The state of Illinois has a very comprehensive program and the United States Bureau of Mines has spent $400,000 for the operation of pilot plants to make gasoline from coal.

It is absolutely necessary that our industry make it attractive for its specialists to continue work on bituminous coal. Bituminous Coal Research is financing a new program which will be a greatly enlarged continuation of its past work. This new program has already been assured of the support of producers of 150,000,000 tons per year and requires at least $2,500,000 for the next five years.

The Conservation of Fuel

There are Many Ways in Which Our Fuel Supply Can be Conserved—and All of Them Must be Employed

By HENRY F. HEBLEY
Director of Research
Pittsburgh Coal Company

DURING the heating season of 1943-44, bituminous coal from central Pennsylvania and West Virginia supplemented the inadequate supplies of anthracite and fuel oil in the Eastern area. Spring, however, has brought a tendency to relax our efforts toward economy.

Candidly, the present position of the United States is precarious. The reserves of petroleum in the United States is a matter of deep concern. At the present rate of consumption only 15 years' supply is available, but this may take 50 years to recover.

The phenomenal growth of gasoline and Diesel engines has influenced greatly the percentage of refined oils produced. In 1912—13 percent of the crude was converted into gasoline. Today yields of 70 percent are obtained. The number of new wells drilled per year has increased, but the new reserves discovered by such drilling has steadily dwindled.

Natural gas is also being closely scrutinized. In recent winter months there has been an extremely heavy demand on the gas supply lines. This has been so great that a number of vital industrial plants had to shut down temporarily because of lack of gaseous fuel. Coal, both bituminous and anthracite, has had to assume the fuel burden for the oil and gas diverted to other uses. In addition the increased tonnage required by the iron and steel industry, the railroads, and general manufacturing establishments engaged in war production has had to be met by coal.

Coal mining is a wasting asset industry, yet because of economic considerations many millions of tons are left underground on properties that have been abandoned because of expensive operation. It does not pay to mine the coal. This is a disadvantage compared with totalitarian states that insist on a high percentage of extraction. Cost of operation is of slight importance to them.

So far in this war, transportation difficulties have not developed to the acute conditions that were experienced in 1917. However, there is always present the potential difficulties of distribution from the mines to destination. The railroads have done a magnificent job so far. It is estimated, however, that the required car loadings will be increased by 10 percent in 1944. Unfortunately the number of new cars being placed into service will not meet this demand. In order to assure continuance of production in vital war material preference will be given to coal necessary for the following uses:

(1) Coal for metallurgical coke—iron and steel. (2) Coal for by-product ovens and gas manufacture processes. (3) Coal for foundry coke and other metallurgical processes. (4) Coal for shipment to the lakes to forestall the uncertainty of the length of the lake season.

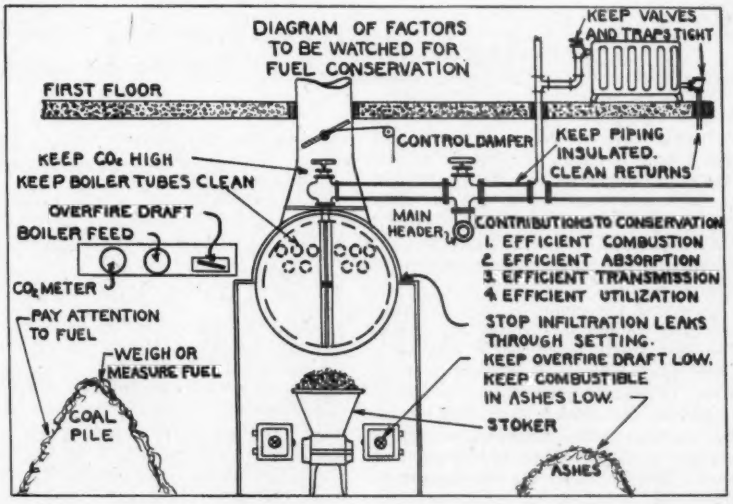
Closely associated with War Production is the electrical energy required for the numerous factories and enterprises. During 1943 about 215 million K.W.H. were produced, representing an increase of approximately 31½ million K.W.H. or 17.2 percent over 1942. Not all of this energy is produced from coal; but for the generation of the additional electric power in 1943 over 1942 by solid fuel, there was an increase of 16.5 percent in coal consumption.

The only possible chance there remains for narrowing the gap between production and consumption lies in the practice of rigid economy. Even if the draft does not take the men there will still be a deficit of 20 million tons bituminous and 5 million tons anthracite.

The organization for placing this economy into effect is rapidly being fashioned into shape. The U. S. Bureau of Mines will sponsor the activities with John Barclay principal fuel engineer in nominal charge and Thomas C. Cheasley as active head, directing the actual activities, assisted by a technical advisory board of well known fuel engineers.

It seems probable at this time that commercial and domestic consumers offer the most fertile fields for economy. Most of these sources of consumption use the fuel for space heating of buildings and in small enterprises requiring a certain amount of steam or heat in their processes. Such loads may be conveniently divided into four classes of fuel wastes: (1) due to poor combustion, (2) due to poor absorption of heat, (3) due to radiation loss in transmission pipes, (4) due to poor emission of heat.

One of the many ways that the program can be helped is by a rapid unloading of fuel consignments upon delivery. The car shortage previously mentioned could be alleviated to that extent. Placing coal into storage piles should be pressed vigorously as it is essential that all mines should be kept in active production throughout the



year. Coal of an inferior quality as well as high grade fuel should be stocked to be sure that some sources of supply are available during the winter months.

In the storage of coal the tendency to spontaneous combustion must be recognized. Coals that will not store well should form the stocks for current supply, while those that show no tendency to fire should be stored for the longer supply period.

It is essential that some tonnage in the stock piles be kept to meet any increased demand that may be made by the war effort. Therefore, the withdrawal from industrial stock piles for other uses may not be practical if there is insufficient coal production to replenish them.

The question may be asked "What can the producer do, restricted as he is by loss of manpower, inability to obtain supplies, and labor difficulties?" There are a number of answers: good maintenance of equipment at the face, good face preparation and good transportation will tend to increase the tons of coal produced per cycle. If power is generated in the coal mine's own power plant, rigid economy in the use of fuel will free just so much mine fuel for other uses. These savings will be attained through the practice of small economies, insignificant in themselves but appreciable in the aggregate. It is little realized that for every degree a room is kept above 68° F., approximately 3 percent will be added to the amount of coal that is required. All departments can help if matters are drawn to their attention. The following points may suggest methods by which fuel can be conserved: One 100-watt light burning continuously, consumes 0.9 tons of coal per year. One 1-h.p. motor running continuously, consumes 8.8 tons of coal per year. One 38" 4-column 5-section radiator turned on 6 months consumes 1.8 tons of coal per year. Numerous other commonly unnoticed losses through leakage, improper insulation, etc., could be cited.

All the points that need to be checked for fuel waste would cover many pages. The best that can be done is to bring about a realization in the coal industry of the imperative need for economy in the use of fuel. Up to the present no fuel rationing has been adopted. It has even been voted down by the War Production Board. Future supplies available for the consumer will, however, govern what changes in policy may be adopted.

Froth Flotation of Anthracite Silt

Pilot Plant Tests Indicate the Economic Possibilities of Recovering Anthracite Fines by Flotation

By W. J. PARTON
Preparation Engineer
Lehigh Navigation Coal Co.

DISPOSAL of silt produced as a waste product in the mining and preparation of anthracite is a problem which must be solved by all the anthracite companies. The logical channel for disposing of the coal content of the silt is through the markets. Although the market for fine anthracite is not ready to absorb all the fine sizes which could be obtained by cleaning this silt, the Lehigh Navigation Coal Company investigated this phase of preparation.

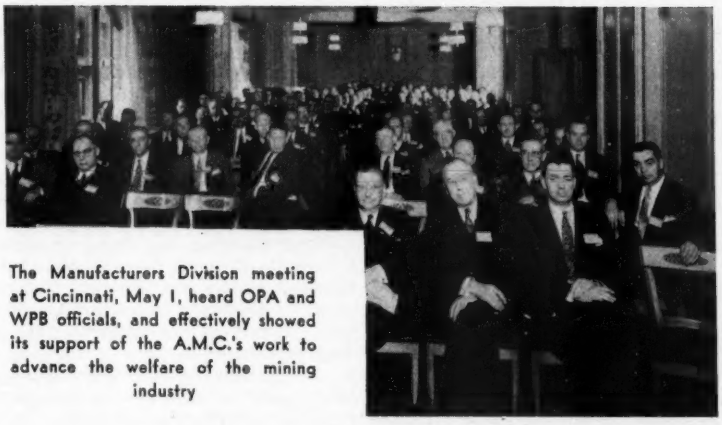
None of the common coal cleaning methods appeared suitable for cleaning the small particles of silt with such a large range in relative particle size. Concentrating tables operating in conjunction with a hydraulic classifier could probably come the nearest to doing a good job. However, capacities would be low. Since the application of the froth flotation process was used successfully in cleaning bituminous coal, the decision was made to erect a pilot plant to determine operating data, capacities and costs.

The silt is discharged from the breaker with the water used in the wet cleaning processes. The suspended solids constitute approximately 5 percent by weight of the slurry. The size and ash analyses show that only a small percent of the solids are larger than 28 mesh but that 45 percent is smaller than 200 mesh in size. The ash content increases progressively as the size decreases. The minus 200 mesh contains 40 percent ash due to the presence of finely divided clays.

The first step in the recovery of the coal was that of reducing the quantity of water so that water in excess will not have to be handled. Furthermore, it was found that removal of most of the minus 200 mesh high ash material was desirable to permit the most efficient flotation of the coal. Since a hydro-separator could be used to eliminate the undesirable finest fraction with the excess water, classification tests were conducted to determine the size of hydro-separator required.

Laboratory flotation tests were conducted to determine the most efficient reagents, quantity and method of introducing reagents into the cleaning system. Although this paper is not intended to go into the theory of froth flotation, a brief discussion of the principles involved may be helpful. For froth flotation it is necessary that air bubbles should attach themselves to the surfaces of the particles to be floated. Obviously, air attachment cannot take place unless the surfaces of the particles are water-repellent. Coal generally is partially water-repellent, whereas the refuse particles of slate, shale and silica are water-avid. By adding a small quantity of water-insoluble oil to the mixture of solids and water, the oil becomes attracted to the coal particles. The oiled particles are air-avid and hence are in the correct condition for flotation. The oil used for this purpose is called a collector. Subsequent transportation of the oil-coated coal particles to the surface of the mixture of water and solids is accomplished by attachment to bubbles which are formed by aeration of the mixture of water and solids. Organic substances called frothers are used to form bubbles with elastic envelopes or films so that they are preserved when they reach the surface.

Yarmor F Pine Oil or B-23 Frother were found to be the most efficient frothing reagents, whereas a No. 2 fuel oil gave the best results as a collector. The most efficient use of these oils resulted by adding small quantity ahead of the flotation followed by additional small increments directly to the flotation circuit as found necessary to maintain maximum recovery. Most of the coal was recovered during



The Manufacturers Division meeting at Cincinnati, May 1, heard OPA and WPB officials, and effectively showed its support of the A.M.C.'s work to advance the welfare of the mining industry

the first few minutes of contact time in the cell, whereas the remaining coal required considerably more time and reagents.

Dewatering of the coal froth was investigated by natural drainage and filtration. Since natural drainage was quite slow, mechanical dewatering of some form appeared necessary.

The feed to the pilot plant was tapped from the flume which carries the waste water from the cleaning plant by inserting three sheet iron slicers. The slurry water for testing flowed to the feed-well of the 22-ft. hydro-separator which overflowed most of the minus 200 mesh particles and raked the settled solids to the center of the tank. A diaphragm pump elevated the thickened, deslimed solids from the hydro-separator to a 6-ft. diameter conditioning tank.

Reagents from the reagent feeder were mixed with the pulp in the conditioner. The pulp was then sent to the flotation cells. Additional collecting and frothing reagents were added to the cells to maintain flotation. The clean coal was removed from the cells and flowed directly to the dewatering filter or screen. The refuse flowed directly to waste.

Operation of the pilot froth flotation plant indicated that 50 to 60 per cent of the silt as discharged from the breakers could be recovered as marketable coal. The coal product was sufficiently low in ash content but the moisture was higher than desirable after mechanical dewatering.

All the economic factors in the recovery of the fine anthracite from wash water by froth flotation could not be definitely determined by the pilot plant. Cost for power and reagents was 13¼ cents per ton and the other costs of labor, maintenance and carrying charges appeared to be sufficiently low to make the project appear economically feasible. The problem of complete drying of the product before shipment to facilitate unloading and handling by the customer is still being considered. If this step is found necessary, the cost of preparing this fine coal will be considerably increased.

As a result of the investigation, efficient circuits for cleaning and dewatering the fine coal were developed.

Complete Seam Versus Selective Mining

By J. W. WOOMER
Mining Engineer
Wheeling, W. Va.

THE term selective mining has come to be generally applied to what should be more properly called *bench mining*. Its true meaning is the mining of material in a sequence that permits segregation of "pay" material from "non-pay" material as the excavation is made.

The hand loader, working in a seam with bottom material to be lifted, bands to be sorted out of the coal or drawslate to be loaded or gobbed, is mining selectively. The operator who cuts out a band of impurities, then loads coal from benches is selective mining in a sequence. The operator who loads two benches of coal separately, or produces coal from various sections separately, is selective mining in the narrower sense with sequence factors. Obviously, multiple face operations for quality reasons increase costs. The answer is mechanization.

Fortunate is that operator whose product is all pay material. He can put existing machinery into his operation and except for tracklaying, posting, bugdusting, shooting, traveling, etc., say he is mechanized completely. He has only to watch that his competitor may equal or better his costs by new methods or new machinery.

This paper proposes to confine itself to the mining of the Pittsburgh seam known principally for its variation in thickness, its characteristic middle bands, drawslate and fair to poor roof.

The relative total labor costs, including payroll taxes, for mining in all the Pittsburgh seam area for 1942 shows as follows:

	Per ton
Hand loading mines' labor	$1.72
Mechanical loading mines' labor	1.29
Stripping mines' labor	.75

These are averages, but the averages that determine selling price of this coal. They are presented to show the contrast of practically no crew mechanization (hand loading) through partial crew mechanization (machine loading) to practically full crew mechanization (stripping).

Selective mechanical mining with operations done in sequence, calling for a complicated loading cycle whether drawslate is timbered up or taken down, has come a long way toward the goal of 100 percent mechanization, or at least that part which we can now vision will be mechanized. Without desisting in efforts to get mechanical bugdusting, faster drilling, speedier shooting, better bits and lubrication, the most obvious field for improvement of crews, excluding service haulage, is in the handling of non-paying material.

To attain this end various methods have recently been used, all predicated on retaining selective mining, viz:

(1) Timber drawslate with wood or steel. (2) Cut and gob drawslate with a machine. (3) Use single or double wing cuts to drop some of the drawslate into the gob. (4) Use the present loading machines to load coal and gob drawslate during operating shift. (5) Combinations of (3) and (4). (6) Use additional loading machine to move drawslate only, on off shift.

While some of these methods apparently mechanize the job 100 percent, and some progress has been made, the ultimate job is still to be done. The deficiencies are: too much dust; too much hand work timbering drawslate; poor design of present coal loading machines for gobbing; too much equipment in a production entry; too little tonnage per shift per production entry; and most all of the methods are complicated by drawslate that falls during coal loading, destroying the orderly sequence feature of the systems.

Some Pittsburgh seam operators are now Complete Seam mining. They are seeking to mechanize and decrease drawslate handling costs with some other possible production section advantages. Face crews can be made smaller, certain phases of the cycle simplified, crew management simplified, hand-gobbing eliminated, and instead of building a sequence cycle based on preparation of the place for a coal loading time, load all of the seam together. The segregation of pay material is done mechanically and on the outside.

This paper has attempted to illustrate the goal and the progress made in one seam:

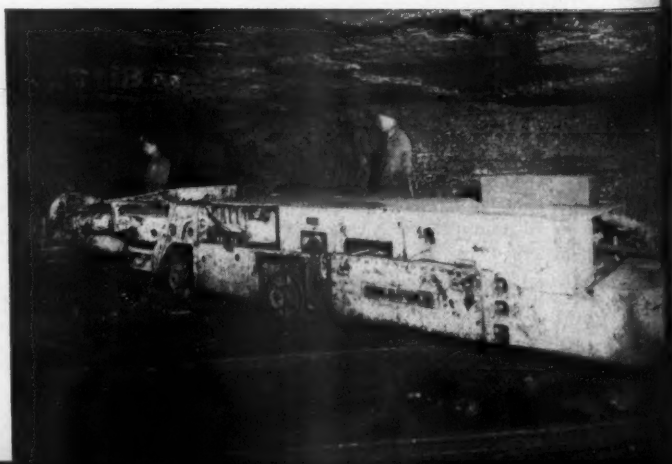
First: For the mining industry. (a) Face mechanization is making progress. (b) Some are forgetting about mining coal and looking at material handling. (c) Face mechanization will increase. (d) Complete seam mining may be worthwhile in entry work alone.

Second: For the manufacturers of face mining equipment. (a) The right gobbing machine is not yet available. (b) Basically the industry wants high tonnage per production machine. (c) The industry wants to mechanize that portion of crew work which is still difficult.

Third: For the manufacturers of preparation plants. (a) High labor costs and interference with crew loading technique may shift selection to the cleaning plants. (b) The need for preparation plants can be more than a particular size betterment job. The plant may do more to cut face cost than it can do for marketing. (c) Knowledge of a given mine from face to customer, and of the whole industry, may improve operator satisfaction.

Fourth: For the United Mine Workers of America. (a) Progress toward complete face mechanization is being made. It is a healthy sign that coal and its employes will retain its rightful portion of the nation's fuel requirements.

Fifth: For the fuel consumer. (a) Progress toward complete face mechanization indicates that coal as a future B.T.U. purchase will be sound.



Since multiple operations to produce cleaner coal increase costs, the answer in selective mining is mechanization

Underground Power Distribution

By C. R. NAILLER
General Manager, Underground Mines
Hanna Coal Company

MECHANIZED mining depends for success upon nearly continuous operation of mining, loading, and haulage equipment. Mechanical mining calls for a high concentration of working sections and relatively frequent equipment moves.

The projection for the electrical load centers over a given period, is definitely tied in with the mining projection, due to the direct relation of load centers to center of concentrated mining operations.

Electrical power problems become part of mining plans. As working unit areas are projected over a period, so can electrical load centers of these areas be determined. In addition to the load of productive face equipment, the load of auxiliary and main-haulage systems plus load of pumps, compressors, etc., can be predetermined for the electrical projection. When the electrical projection for load centers has been completed, it is possible to accurately locate conversion units, in accordance with the combination mining and electrical projection.

The necessity of fitting the D.C. distribution system into the projected mining plan means that no specific rules could cover all cases. In general, however, any D.C. distribution and conversion system must meet the following qualifications: continuity of power, total power consumption reduced to a minimum, and economical installation and maintenance cost.

Conductor capacity is an important factor in distribution. For a 275-volt D.C. system, a 20 percent drop in line voltage between the conversion unit and the working equipment is considered to be within the limits of good practice. A voltage drop of 10 percent to 15 percent is not uncommon in secondary conductors. Since both primary and secondary loss should not exceed 20 percent, voltage drop in primaries must be held to a maximum of 5 percent. Thus primary conductors, both positive and negative must have sufficient capacity to insure that the voltage drop will not exceed 5 percent in the primary circuit.

High capacity main conductors mean that a system of interconnected conversion units may be employed, with the assurance that, if one station fails, the adjacent station or stations can maintain a fairly satisfactory line voltage to the point of utilization.

The choice of conversion units for mine operation is limited to rotating equipment—converters, motor generator sets and rectifiers. The function of any conversion unit is to convert A.C. power to D.C. Mechanization has placed demand for portability upon the conversion unit, and portable conversion equipment for inside installation has gained favor. Rotating equipment is subject to arc-overs on peak loads, operates with poor efficiency at partial loads, has low peak-load capacity (200 percent for one minute) and usually involves considerable maintenance expense. Rectifiers have a higher peak-load capacity (300 percent for one minute), and as there are no moving parts other than auxiliaries, have a low maintenance cost.

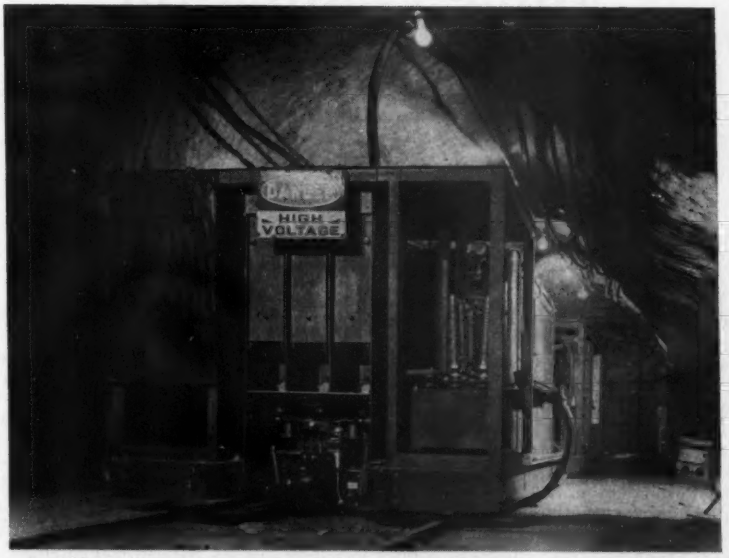
Our actual operating experience with rectifiers in mining service includes two surface installations, one a 600-volt single-tank type, the other a 600-volt cubicle type, and four underground portable units.

The pumped-tank type rectifier does a good job when subjected to extreme load conditions and may be operated with a maintenance cost of about .001 per ton using thyratron tubes whose replacement is a major maintenance cost item for firing.

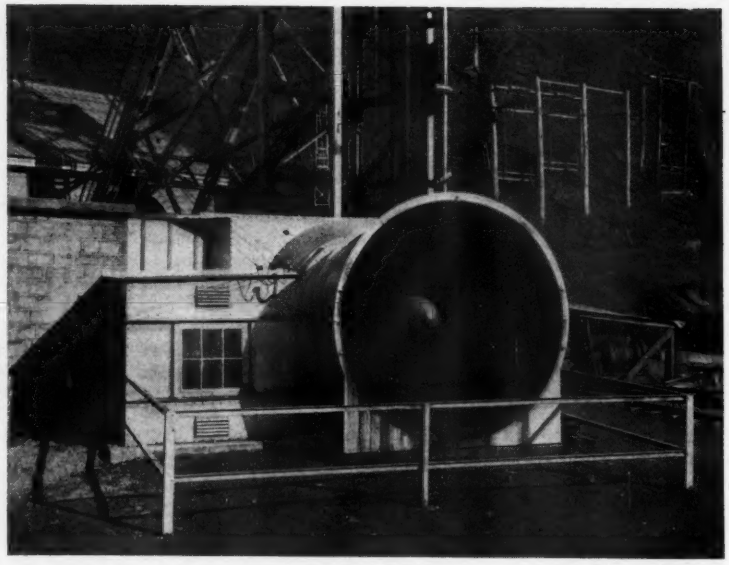
From operating experience with a 300 K.W., eight tube, sealed tube type portable ignitron rectifier set, it is our opinion that this type rectifier, with tubes in multiples of three where three-phase A.C. power is to be converted, is more adapted to the needs of mechanical mining than other conversion units available. The limiting factor is the difficulty of dissipating heat from the heat exchanger and the transformer. A permissible use of 90° is desirable in the heat exchanger for full utilization of the unit. Air-cooled transformers with auxiliary ventilating units on new rectifiers purchased give further heat dissipation, and eliminate the fire hazard. From the experience gained from operation and maintenance studies a 400-K.W. unit was selected and installed during September, 1943.

The substation electricians visit each installation twice a week, making a visual inspection on the first visit, and utilizing a week-end visit for general maintenance. We relegate responsibility for inspection and maintenance of conversion units to one qualified man at each mine. We prefer that this same man perform all maintenance work in order to eliminate the errors arising from too many different men tampering with the units.

The portable type ignitron rectifier is ideally suited to mechanized mining because of its ability to handle peak and heavy overloads and its service availability, wherein it is almost always possible to cut out defective tubes or other defective parts of the set and thus obtain some service from the set without a complete shut down.



Portable ignitron stations have provided an excellent answer to the problem of properly located electrical load centers



Mine Ventilation

Increased Output and Use of Mechanical Equipment Adds to Ventilation Needs

By J. A. SAXE
Chief Engineer
Island Creek Coal Co.

TWO events have had a marked effect on the ventilation of many of our mines. First, the low production schedules prevailing in most mines from 1929 to 1938. The effect of nine years of neglect in maintenance of main air courses was a greatly lowered capacity and high resistance to air flow. Second, the sharp increase in loading coal mechanically beginning in 1936. We find larger splits or more splits required for adequate ventilation of mechanized mines. In gaseous mines the greatly increased daily rate of face advance has caused a large increase in gas given off at the face, sometimes actually limiting the rate of face advance even with air supplied to the face at a rate of 5,000 cfm of fresh air for each working place on the split.

The mining companies with whom I have had any experience, go beyond the provisions of the mine law in that they intend that their mines shall have ample ventilation, safely controlled and distributed in an economic manner. They believe that effective ventilation is their first line of defense against disaster and essential to the safety and welfare of their workers.

To accomplish the type of ventilation most mine managers desire, two things are necessary:

1. A ventilation plan, set up by competent engineers.

2. Periodic ventilation surveys to determine the working of the plan.

Given such a plan, company inspectors, mine superintendents and foremen will easily furnish competent and economical handling of ventilation. The principal criticisms of ventilation systems are for deficiency in volume, improper coursing, or the lack of positive control of the distribution.

The ratio of the quantity of air in circulation at the face intakes to the quantity of air measured at the main intakes is the quantity efficiency. The quantity efficiency commonly observed is 35-45 percent. Except under unusual conditions, 70 percent of the air measured at the main intakes should be measured at the split intakes. This statement is true for mines where the distance from the intake to the face does not exceed 10-12,000 ft. and stoppings are stable. A simple anemometer survey of the intakes has frequently located short circuits of 10,000 to 40,000 cfm. Similar altimeter surveys and inspection have located stoppings, door frames and other restrictions that were once useful but forgotten when the ventilation system was extended.

In the coursing of air, generally the haulage, and adjoining entries where necessary, should be on intake air. Return air so-called by direction should properly be so classified only when it has become contaminated beyond safe use. Working places should not be ventilated by an air current that has passed through abandoned workings or pillar lines that cannot be, or are not, regularly inspected. Working places beyond one breakthrough distance from the last breakthrough should be avoided in gaseous mines.

The lack of positive control of ventilation, i.e., inability to compel air to travel constantly in uniform quantity and direction in its provided course is another cause for ineffective ventilation. The remedy is the proper location and installation of suitable stoppings, air locks, brattice and regulators. In the case of adjoining pillar areas on different splits, balancing split pressures may be necessary.

Attention is called to the fact that the variable pitch blades in the axial flow fan permit the operator to keep his fan operating at or near its peak efficiency under changing conditions of volume and pressure demanded by the development of a mine. Further, with a constant mine E.O. a considerable change in capacity may be obtained by adjustment of the fan blade position.

On the average mine cost sheet ventilation appears as an almost inconsiderable item. The cost of power is thought of as the principal factor.

The money invested in a ventilation system properly includes intake and return openings, ventilating plant, stoppings, doors, regulators and overcasts. The average total investment for a 10-year-old, 2,000-ton shaft mine is about $200,000. In larger mines with average depth shafts the investment in a ventilating system frequently rises to more than $500,000. A large part of the money invested is spent in small increments for stoppings and other control structures. This cost is usually absorbed in general mine expense. The salvage value is practically nothing. To allow investments of this order to continue functioning at the observed low levels of efficiency and effectiveness will continue criticism of our ventilation and unnecessary expense. Soundly engineered planning of ventilation, with good maintenance can keep the plant investment at a minimum and provide safe, effective and efficient ventilation.

Well managed safety programs contribute importantly to manpower conservation

Safety in Coal Mining

The Cooperation of All Concerned is Necessary to Maintain High Standards of Safety

By W. D. COHELIA
Safety Engineer
High Splint Coal Co.

To every man in the coal industry comes a time when he must stop and consider Safety. It is important now that Safety loom larger in our thoughts and our work than ever before. This year we are faced with loss of manpower to the armed forces and the war production plants. The industry has been called on for the largest production ever required. Those who remain must supply the production needed and do it safely. The loss of production due to accidents can be stopped with a little extra effort on the part of all concerned.

Each individual and each operating company is all out to keep up production and is for safety also, but sufficient effort is not being made in that direction and it is vital that this should be done if accidents are to be reduced and manpower saved to work and produce the coal needed. How can this be done? How can we hope to save our fast dwindling manpower? It can certainly be done with cooperation, intelligent thinking, and concerted effort on the part of all concerned.

Material things constituting the spoilage attending an accident are replaceable; human life and limb are not; you just can't reach into the market and get an eye—an arm—or a leg when these members are lost. Oh yes, you can get substitutes, but they can never make the human machine as good as new.

The coal industry today can ill afford to dispense with the services of a single skilled workman in any phase of mining and as the tension increases and production demands are more insistent, the loss of even one skilled man will be felt even more keenly. Is it, therefore, not apparent that the personal safety of all workmen in the industry is not only personally desirable and profitable, but a patriotic duty as well.

How can we train the new men entering the mines to meet the hazards of their new profession? There are many ways that this can be done, but we must approach our problem with a broad sympathetic understanding of the type of men we have to deal with. We must note his intellectual outlook on life. We must study the man! Each man should be interviewed and placed where his particular ability would be an asset to himself and the company employing him. The dangers inherent in the type of work he is to be engaged in should be pointed out to him, and the point stressed that he will be on a probationary period until he shows that he is a safe workman.

Foremen should be warned about all new men and see that they familiarize themselves with conditions and Safety rules. The foreman is in the place of a leader, not a driver, and he should endeavor to lead at all times. If it is humanly possible, a new man should be placed under the care of an older and more experienced and safe workman. Often times, however, years and experience don't teach Safety, so the older man should be safe himself and able to teach the new man Safety. The new employe should be instructed in first aid to the injured, and the importance of such training should be pointed out to him.

Sectional meetings inside the mine should be held every morning, either before the men get in the mantrip or when they leave it. A board with the date of last accident and name of man should be placed at entry where all sectional men must pass. Monthly meetings to discuss accidents should be held and all men invited to take part in these meetings.

There are jobs in the mines where such a procedure is not applicable. Where this is the case (as in haulage, timbering, etc.), it should be strongly emphasized that workmen proceed with care and follow all Safety precautions. If such methods are followed the new untrained man's productive capacity can be greatly increased and *increased with Safety.*

I wish I could point out a panacea for all our ills. However, I can say that if we approach our problems intelligently and have the active cooperation of all concerned, then we can and will succeed. Not only that, but we will have greatly reduced lost time and fatal accidents in our coal mines.

I believe the time for action has arrived on the part of Operators, Management, and Employes. They must get together in a common effort to eliminate human suffering and production losses caused by accidents.

Drainage In Open Pit Mining

Complete, Well Organized Plans are Essential to Successful Pit Drainage

By LAFE STEWART

Chief Engineer
Maumee Collieries Co.

THE problems of open pit drainage must be adequately solved before maximum efficiency can be realized. Thorough consideration of drainage problems is a prerequisite to all general plans for development of a strip mining property. The magnitude of these problems varies greatly with location.

The subject naturally falls into two distinct classifications, Surface Drainage and Pit Drainage. The first and prime objective of surface drainage control is to prevent surface water from entering the pit. This is accomplished by gravity flow ditches and requires no rehandling by pumps. Once established, surface drainage requires no considerable attention or maintenance.

Primary among progressive procedures is thorough visual inspection. All available maps of the area should be obtained. Notation is made of location and extent of watersheds, size and character of natural runoff channels, high water marks and topographic detail. A selection can then be made of possible collection or discharge points. The capacity of the streams or ditches below the discharge points should be carefully checked in order that the additional water from the collection area does not overload the channel.

The second step is the preparation of adequate surveys and maps. The survey should provide control points at intervals sufficiently close that subsequent location of any point in the field is simple. The mine superintendent is thus always sure of his location and much layout work is eliminated.

The third step is selection and paper layout of a general surface drainage plan. The operating plan, complete with successive deadlines is first plotted. The main ditches are then laid out roughly parallel to, or draining away from, the development.

Small lateral or plow ditches should then be provided at intervals close enough to allow short pit pump connections and to minimize uncontrolled runoff to the pit.

It will now be possible to estimate the volume of water which must be handled. Local weather records, figured watershed areas, plus inspection will serve as a basis for determination of runoff factors and calculation of ditch sizes and costs. In some instances levees must be provided.

After preparation of a general plan, construction can be scheduled to keep pace with pit development, far enough in advance to utilize available equipment to the best advantage.

In the process of development of surface drainage systems, it sometimes becomes necessary to provide a drainage channel across an open cut. This may readily be accomplished by various means, ordinarily trussed flumes or pipes. Considerable volumes of water have been handled in this manner. Construction should be located so that the installation will serve for as long a time as possible.

In locations where the pit bottom is above natural drainage the problems of both surface and pit drainage become much simplified and less costly procedures. Even in these pits, however, flow control on the highwall side is necessary in order to divert heavy runoff.

Gaps in spoil banks may be maintained in the first few cuts, but this is not always feasible or economical as the stripping unit progresses to deeper overburden. An effective passage may be continuously maintained, however, by placement of pipe or culvert which is covered by the spoil and extended across each successive cut. Drainage gaps in the spoil do double duty by being constructed wide enough to accommodate a haulage roadway.

There are, in connection with coal mining, various complications which may arise from the disposal of water from the pit. These stem from the high sulphur and mineral content of some mine waters, which may result in the pollution or contamination of natural waters used for fishing, live stock or industrial consumption. This situation sometimes is so serious that these waters must be segregated and separately handled.

In general the most widely accepted and economical plan for pit drainage provides for the location of one or more main sumps at low points in the pit, so located that a discharge point is close and readily reached. The most economical point for location of the main sumps is not always apparent at first inspection. The pit layout should be examined for low discharge points as well as low points in the pit. In many cases substantial savings may be made in equipment and power consumption by use of low-head relay of water from a low point in the pit to another point which has a substantially lower discharge elevation.

Ground water is sometimes a very considerable problem. In certain locations, we have had excellent results in clearing old mine workings by use of deep well pumps. These pumps can be set over a cased drill hole to a low point in the old workings and put into operation in advance of the stripping development. Conventional pumps may be used due to the fact that excessive mud and trash conditions are not present.

Most pumps for open pit installation are of the type known as trash pumps, due to the inevitable accumulation of debris of all kinds in the pit. These pumps must be capable of handling a high content of mud and slop as well as trash. The problem of pump selection then resolves itself into a problem of analysis of the requirements of performance and capacity rather than a type or brand of pump. Most main sump pumps are of centrifugal, high head, high capacity types. These pumps are fairly efficient, simple and easily maintained. Auxiliary pumps, used only to relay water at low head may be of nearly any type having sufficient capacity for handling the volume required.

The larger pump sizes require considerably less power per unit of discharge, and their tendency to stop up with mud and trash is less than in the smaller sizes. By proper use of ditching through the fire clay and relaying by low head pumps across humps in the pit, many hundreds of feet of small hose and the consequent friction is eliminated.

We are satisfied that it is economically sound and sensible to provide, for each and every pit operated, a complete and coordinated plan of surface and pit drainage.

Selection of Haulage Systems

Choice is Based on Economic Length of Haul for Various Sizes of Units and Availability of Road Materials

By HOWARD L. ASBELL
Truck Superintendent
Sinclair Coal Co.

I WILL endeavor to make clear why we have made our haulage selections to meet particular demands.

First, it may be of interest to know why the first truck haulage was used by us. Railroad grades have a maximum limit and for economical reasons maximum miles have to be considered. In order to begin operations in north central Missouri it would have been necessary to build six miles of railroad in order to have grades within maximum limits. By building a truck road we reduced the distance to one and three-quarter miles to the first box pit. Some grades were as much as 9 percent, but later were reduced to a maximum of 5 percent.

We began operation with six semi-trailer units, of 6-ton capacity, over an oiled dirt road from a single entry pit. The main haulage road had to be of different structure in order that production could be maintained, rain or shine. The bottleneck in the single opening pit was eliminated, with runways at regular intervals, with the result that nine units were necessary to prevent idle loader time; production was increased.

Using the coal for a permanent road eliminated mud but, due to roughness, slowed the operation and increased spring and frame maintenance. We finally decided to use the following system:

Load all the coal, except a rib for the trucks to run on, until we had at least a day's loading in the rib. Using the fireclay for a road we would load the rib and entire pit. In prolonged rainy seasons it was necessary to leave the rib to the next regular runway, load it the first dry day, or if the shovel was close, load regardless of weather. The use of multiple runways kept the length of fireclay road to a minimum and gave a coal road at most times. As the field depleted, haul became longer and we had to try something new in haulage or have 18 or 20 small units in operation. We were then using 13 6-ton units.

Two trucks and semi-trailers of 15-ton capacity were purchased and their operation prompted us to replace the small trucks with seven 15-ton units. Our road building had been very successful with the 6-ton units, so we built a main haulage road of cut-back asphalt and rock. After the third day of use, pride changed to gloom. Fifteen tons at 35 miles per hour caused the road to separate at the crown, and the beautiful surface began to buckle and crawl toward the ditches. A better base was needed.

Again the haul increased beyond the economical range of our larger units and something had to be done or give up truck haulage. We purchased a fleet of six 40-ton units and successfully completed the operation with a final haul of 14 miles round trip over a road with three hills of 1,500 ft. of 4½ percent grade each.

Truck haulage has proven better than rail haulage in many ways: economy, flexibility, dependability, increased hourly production, better supervision, and unity of stripping, loading and preparation systems.

There are times when we must vary from our regular system, due to prolonged rainy seasons and excess seepage. By maintenance of regular runways and leaving the rib for a road, production is not impaired to a great extent.

In the Catoosa and Broken Arrow, Okla., fields we have a rock formation under all the coal and have no mud to contend with. At Catoosa the thin vein coal is loaded with two Joy underground loaders. This system will average 1,750 tons per eight-hour day; and could not function without flexible truck haulage.

At our Hume-Sinclair mine we are now using a combination truck and rail system. Three factors governed our selection of this system: freezing of new equipment, conservation of rubber, and having the Missouri Pacific Railroad available as a carrier—eliminating the necessity of building a spur. At this mine we have six 80-ton units and in normal times would have built some new roads and hauled entirely by truck as the total distance would not have been outside the economical range of these large units.

Available tonnage now governs the selection of haulage systems more than ever. Many operations of today are on a small scale in which it is imperative that we use dump trucks, due to inability to maintain multiple runways and first-class roads. Available tonnage also brings every operator to a point where a decision must be made on one of two things; change haulage system or move the preparation plant. Changing the haulage system by using more units is expensive, but not prohibitive in limited tonnage moves. The installation of larger units, if possible, is the most economical. In some cases in order to obtain more tonnage, with present equipment, longer hauls can be made by sacrificing some profit to haulage expense. Our experiences have taught us that when the economical point is passed, available tonnage being sufficient, the operation should be re-engineered and moved so as to unify the whole system.

Truck haulage, of from 15- to 40-ton unit capacity, can be successfully operated with same type and capacity loading equipment. In units of 80-ton or greater capacity, the size of the loader and hopper should be in relation to the size of the haulage units.

From my experiences and observations, I am convinced that, with wartime engineering, flexible economical truck haulage will exceed its present limits—100-ton haulage units are just around the corner.

Complete proceedings of the Coal Mine War Conference available in the 1944 Coal Mine Modernization Year Book. Place your order NOW.

Methods Of Drilling and Blasting

Proper Procedure is Best Based on Previous Experiences

By T. H. LATIMER
United Electric Coal Cos.

SOME few mines are blessed with territory that needs no blasting, but these are very much in the minority. Some are still stripping without shooting the bank, even sacrificing shovel efficiency and putting up with high maintenance (perhaps through stubbornness) but it is a problem to be faced eventually by all of us.

There are two major methods of drilling holes: horizontal or vertical—or a combination of the two, and choice depends entirely upon the bank. The type of digging encountered generally dictates the choice.

One major problem at every mine is box cutting, and when rock or hard shale is present, proper shooting is the difference between a smooth easy-going operation and untold grief. In one case it was not necessary to dig down from the surface, but the cut was started from an operating pit. It was rather an unusual condition in that the greater part of the cut was not along the crop line, and it was necessary to blast out and dig through the solid rock. In this cut the dragline was used to take off the surface material down to the rock, which averaged approximately 14 ft. in thickness. The surface material was taken off before the rock was drilled or blasted. There was shale between the rock and coal, soft enough to require little shooting. Fourteen feet of solid limestone has proved in practice to be too heavy for good fragmentation when shot by horizontal holes, and there would also have been the added nuisance of interference with the shovel.

The rock was drilled with 9-in. churn drills. Holes were spaced on 24-ft. centers, staggered, and loaded with 14 lbs. of 60 percent gel per foot of rock, and shot in groups of about 20 holes, in V's.

All the holes of the group were shot simultaneously, no delay caps being used, but the holes next the face were wired to shoot first. Box cut digging is always difficult, but a 26-yd. shovel was able to move through the shattered rock at the rate of 950-1,000 cu. yds. per hour.

Both vertical and horizontal methods of drilling are used, in our regular blasting, depending entirely on the country to be shot. Horizontal drilling in shale can be accomplished at a fraction of the cost of churn drilling and is used wherever possible. It is limited by height of bank, thickness of rock, and interval between rock and coal.

It is impossible to standardize on an explosive to suit all conditions, but in this case a 40 percent dynamite of moderate speed with the largest possible production of gas yields the best and most uniform results. Holes are driven to the depth of the shovel cut, and all explosives are placed at the back of the hole.

Over 90 percent of our drilling must be vertical. Churn drills with 9-in. bits are used, and years of experiment have resulted in the uniform spacing of practically all holes at 27 ft. (staggered). This is, of course, not a hard and fast rule, and must be altered to meet extreme conditions. Also, holes are charged uniformly with 10 pounds of liquid oxygen explosive or 12 lbs. of 60 percent gel for each foot of rock.

In this operation the tandem method of stripping is used. A dragline follows the shovel, removing up to a third of the overburden. The dragline bench is not such as to facilitate the passage of drills, and for this reason the entire territory is shot ahead of both strippers, necessitating a large inventory of drilled and blasted ground. Thus all shooting is against a buffer. Excellent fragmentation is obtained and displacement is sufficient to make easy digging for the shovel.

Hardness high in the bank is a terrific shock on a stripping shovel. Our top rock is blocky and seamy and very hard to shatter. Deck loading, both with LOX and Gel, gave fair results, but it was eventually found that placing the entire charge at the bottom of the blast hole was far better.

All vertical holes are driven at least to the bottom of the rock. If no shale is encountered below the limestone and the bit enters the coal, holes are plugged back with sand bags. All holes are shot singly. While this is directly in opposition to all theory of good blasting practice, results justify the single shots. Group shots are very spectacular, but when the bank is entered by the shovel, hardness has always been found, generally between the bottoms of the holes. Somehow this condition is seldom present when single-hole shooting is practiced.

The choice of a drilling method must be based on previous experience, and from this proper procedure must be worked out. There can be no hard and fast rule, but in general in lower banks and in easily displaced material, horizontal holes can be used, but with increased bank and hardness, vertical holes must be resorted to.

The proper explosive is the one that yields the greatest shovel yardage and at the lowest cost, and must be determined for the individual mine.

Regardless of the drilling method and regardless of the explosives used, safety is a prime consideration, and every man engaged in this work must be thoroughly trained to take care of himself and his fellows. All safety rules laid down must be followed implicitly.

Variable hardness in the bank may cause undesirable shock to shovels unless the proper method of drilling and blasting is used

Time Studies In Strip Mining

By GENE H. UTTERBACK
Production Engineer
Enos Coal Mining Co.

OCCASIONAL articles on time studies have appeared on coal mining, but the strip-coal mining industry as a whole has not given much serious thought to the subject.

Time study and production engineering are but branches of the broader field of industrial engineering and scientific management. The individual foreman was formerly depended upon almost entirely for the proper conduct of the work under his jurisdiction. The balance sheet and income statement were once the only guides to profit and loss, and sometimes even these were largely theoretical.

Time study provides means by which management can judge actual results in relation to expected or standard results, both cost-wise and production-wise. It is a tool of the engineer, whose job it is to correlate and analyze facts. In a broad sense time study can be divided into two classes; measurement of human labor; and measurement of machine productivity. Time study is used in most industries as a means for establishing wage incentives. Since that procedure has never been adopted by the strip coal-mining industry, time study is useful for determining production standards, and for checking periodically the work in various departments. The main factors that must be considered are: skill of the workman, fatigue, physical conditions, and the consistency of performance of the workman.

Any type of work can be measured if there is a relation between work performed and results produced. In strip coal mining a good example is the measurement of production of a stripping shovel and establishment of production standards from time-study data.

In our mine, one of the stripping shovels is a 750-B counter-weighted machine, carrying a 22-cu. yd. dipper. For the purposes of establishing the production standard, an allowance of 33⅓ percent is made for swell of the overburden from bank measurement. Thus when level full a 22-cu. yd. dipper actually contains 16.50 cu. yd. of overburden as measured in the bank.

When making the study the observer estimates and records the "percent full" of the dipper on each pass, so that at the end of the study he has an estimate of the yardage handled.

With the accumulation of time-study data about each machine and each operator, management is supplied with the information to back up its claims for corrective measures. Inept, or new operators, can be instructed in the correct methods of machine operation and subsequent checking by time study will show how effective the instruction has been. It has long been known that time study of even the experienced operator has a salutary effect on his activity and some feel this is one of its important functions. It is pertinent to state, however, that in the course of the work of the time-study engineer, he is as likely to find inefficiencies in management as he is in labor, and by the proper analysis these inefficiencies also can be corrected.

From a series of these studies, which should include the work of all operators on each shift, the production standard can be established. Account must be taken of delays and these are divided between operating delays and all other delays. Operating delays, including oiling, moving, trimming top edge of highwall, clean-up passes, etc., are allowed in the operating time when making calculations for standard. All other delays are lost time, and are deducted from operating time.

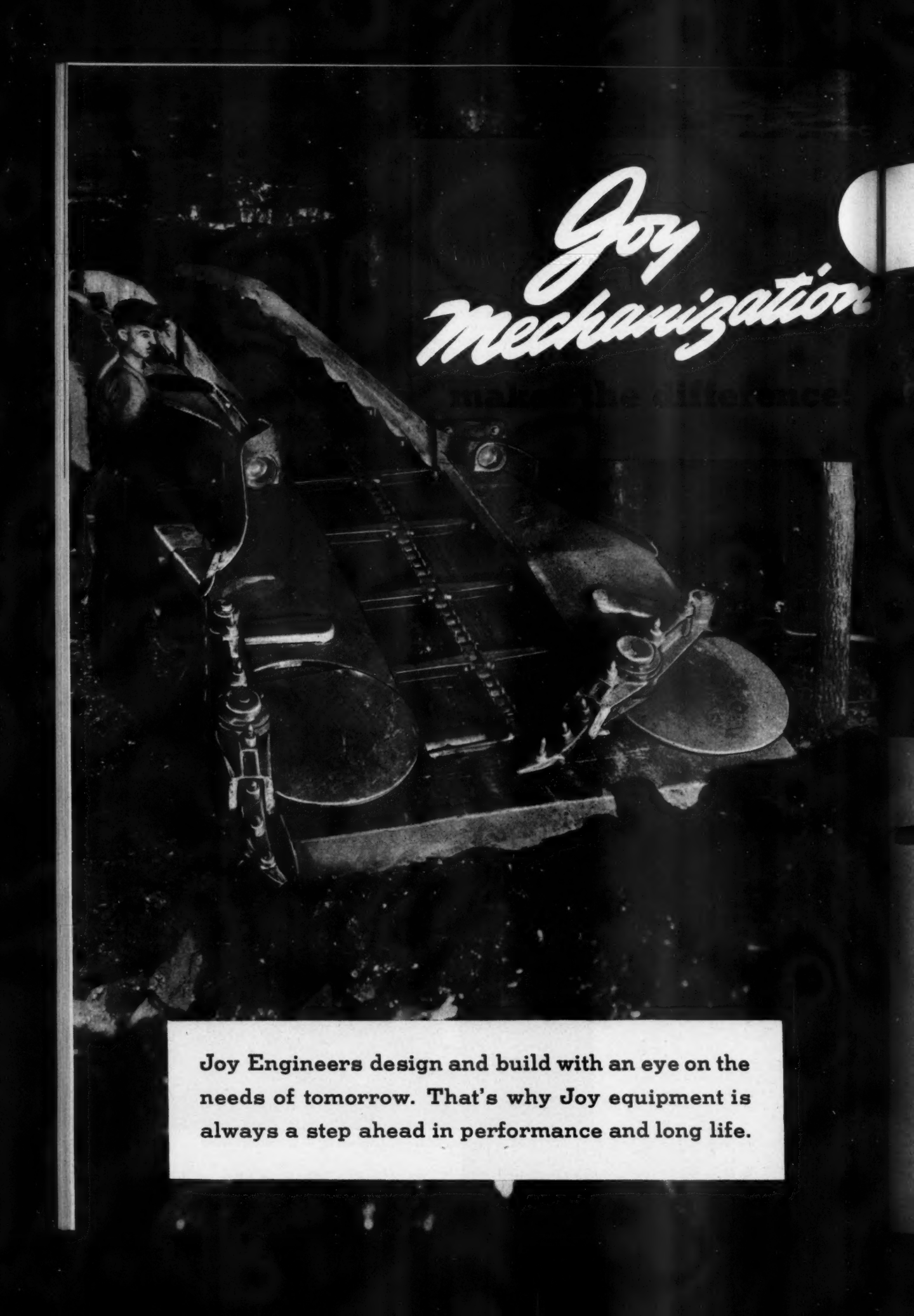
With standards established, management has a gauge for measuring productivity. This is particularly important in strip coal mining where production is dependent on a relatively small number of large producing machines. If attempt is being made at cost and production control of a stripping unit, accurate records of daily shovel performance are indispensable to the blasting engineer. With them he can study shovel activity and performance in a bank drilled and shot according to plan, and thus determine his procedures for succeeding cuts.

It is well to check labor efficiency, and the best method for this is in units produced per man-hour for a given period. By this method, records are always comparable because they are unaffected by changes in length of working day or wage rates.

It is the job of the production engineer to make an engineering analysis of all production problems, in order to obtain the production of goods with a minimum expenditure of human energy and a minimum investment in plant and equipment. In our experience haulage by rail with electrical equipment is considerably cheaper than truck haulage on a per ton-mile basis. Therefore, when it becomes necessary to relocate a transfer point in order to handle the tonnage mined in a newly developed area, due consideration should be given to the correct location for the transfer facilities. In one case, we found the cost of an overhead bridge over the electric haulage fully justified. In another case, we found a relocation justifiable in order to avoid an additional investment in haulage equipment and a resultant lower operating cost.

It is the task of the production or industrial engineer to eliminate waste and wasteful methods, by striving for the efficient utilization of human energy and machine power, and to accomplish this with a full recognition of the rights of the worker as expressed in our democratic principles.

Problems of strip mining hold interest for many coal men today



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Joy Manufacturing Co.

FRANKLIN, PA.

Maintenance Of Machines

Thorough System of Inspections and Reports Helps to Forecast Serious Breakdowns and Thus to Prevent Them

By THOS. L. GARWOOD

Assistant Superintendent
Chicago, Wilmington & Franklin Coal Co.

MAINTENANCE of machines becomes more important now because of the necessity for maintaining tonnage at peak values.

Beginning at the face, we maintain our electric drilling equipment at capacity and have standby units so that a maximum tonnage may be prepared for loading machines. In the panel system of mining, in our Southern Illinois field, a cross entry territory may be worked with three, four or five loading machines in one section. In each section, one or two repairmen handle minor and emergency repairs during the shift and keep all of the mechanical equipment operating. Ordinary supplies necessary to make small replacements are stored in the repairman's small shop on the territory. An oil station also is located on the territory.

Several times during the day, the repairman visits the machines and observes the action and operation of each. His reports to the Maintenance Foreman are passed on to the night repair shift. Section foremen also have reports to fill out describing the operation of machines, and all delays are noted. All reports are finally recapped and through repeated reports on the monthly sheets reveal continued or frequent recurrence of a minor delay forecasting a complete breakdown and repairs may be made before the failure occurs.

The repairmen are organized under Assistant Repair Foremen, who operate directly under the Chief in charge of Machine Maintenance and Repair. Night Maintenance and Repair is carried on under supervision of a Machine Repair Foreman. Major repairs and replacements are made on this shift as well as lubrication of the entire mechanical equipment under ground. Special underground repair cars have been built to carry all the tools needed and since these men travel about the mine servicing machines, each crew uses a locomotive and tool car.

The day shift utilizes the services of nine repairmen who are stationed so that each will serve a small territory. The night crews have a total of 22 men divided into six crews. Three of these crews make repairs or replacement of parts on the machines reported by the day shift as needing attention, while the other three crews lubricate the machines.

Records Important

Reports are made out by both the repair and lubricating crews and are turned in to their foreman, who, after inspection, leaves them for the Chief and for entry on the monthly recap sheet.

For major repairs machines are brought to a central shop where overhead hoists and ample working space are available to allow the machine to be disassembled.

Maintenance of locomotives follows a somewhat similar procedure, minor repairs to the inside locomotives are made by the inside repairman but the more important jobs are done in a central locomotive repair shop, equipped with travelling hoists and a pit between the rails, allowing men to work under a motor.

Locomotive operation is under control of the Haulage Foreman, but repair and maintenance are supervised by the Chief Underground Electrician, who also has charge of the underground power generation and distribution. Limit loads are established by him and printed notices are posted at the dispatcher's stations and inside partings. This limit in number of cars each locomotive is allowed to pull also is posted on the locomotive for the information of the motorman. The dispatcher's record for the day is checked to see that this limit is being observed and for recurring delays indicating faulty operation or equipment on the locomotive.

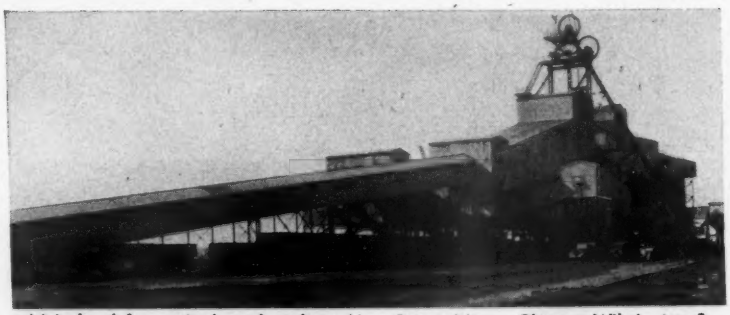
Motor generators, circuit breakers and sectionalizers are maintained by regular electrical maintenance men under the direction of the Chief and Assistant Underground Electrician.

Main bottom dumping and skip loading equipment is maintained and repaired by the men regularly operating this machinery and repair work is carried on after the operating shift or on Sundays. Mine cars also are lubricated and checked by the bottom crew immediately after dumping. Records are kept and each mine car is pulled out of line periodically for inspection and greasing.

Top equipment is operated on one day shift only except for occasional reprocessing of coal. Oilers and regular maintenance men are employed on the day shift to observe the operation, need for repair, and to make any corrections necessary during the operating shift. Notes are made by the top foreman directing the night repair boss to needed work.

Our main or general shop consists of a blacksmith shop, machine shop, welding and electrical repair shops and a car repair and rebuilding shop.

We have 29 loading machines operating on the day shift, nine on the night shift and two McKinlay entry driving machines producing coal. Nine Sullivan 7-AU undercutters, five CLU and eight CE-7's cut and shear the coal for these loading machines. Thirty-five drills are on duty and five either are in the shop or held in the central shop for shipment to points of distress inside the mine. Thirty-three service, and seven relay motors serve the loading machines, and 13 main line motors pull to the bottom. One six-ton storage battery locomotive is available for emergency service and beyond power lines or for traveling when no electric power is available for trolley locomotives.



Main head frame tipple and washery, New Orient Mine. Chicago Wilmington & Franklin Coal Co., West Frankfort, Ill.

Shuttle Cars In Mining Bituminous Coal

Various Methods of Application Have Been Found for This Important Haulage Unit

By G. STUART JENKINS
Assistant General Manager
Consolidated Coal Company

DURING 1930 to 1940 many mines which had not availed themselves of mechanical equipment, were unable to meet payrolls. Those that did buy mechanical equipment found themselves with a large investment in mechanized equipment, and a force of skilled workmen, whose wages remained the same whether they produced one ton or twenty.

The high wage in effect in the early 1930s furnished the final driving motive which resulted in recognition of the fact that a mine can be operated profitably with a relatively high wage scale by use of suitable mechanical equipment, with proper planning and management.

The manufacturer has developed equipment to meet the needs of the modern mine. The lives of many coal mining companies were saved by the manufacturers developing the necessary equipment.

The more equipment you have for a given production, the greater the investment and carrying charges. This emphasizes the point that if an operator examines his records he will find he has a necessary realization to secure, to cover costs of production and meet payrolls.

Our first installation consisted of battery-powered equipment—two behind each loading machine. Loading machines, being mobile, required installation of mobile mining machine trucks, as the cutting was done with shortwall undercutters. This gave a trackless loading unit comprised of a mobile loading machine, cutting machine mounted on a mobile truck and two rubber-tired battery-powered shuttle cars.

An unloading station for the shuttle car, completes the picture, except for the means of controlling the pit cars while they were being loaded.

The unloading station was located at a room neck about midway in the working rooms; a room length of about 400 feet, with five working rooms on either side on 70-ft. centers, added up to about 750 ft. of travel in the rooms which were working out. The shooting was done off-shift so it was necescary to carry this excessive number of working rooms. The rooms at the forward end were just being started, while the rooms at the opposite extremity were just being finished, so that a move of the unloading station became necessary at approximately five-room intervals.

We later tried shuttle cars at another property, loading into large pit cars which held the capacity of two shuttle cars instead of only half a car as in the first installation. This decreased the number of car changes. We were able to get a comparison with continuous gathering, as we had been utilizing flight conveyors, emptying on belt conveyors in the panel entry. This belt conveyed the coal the length of the panel entry and discharged it into large mine cars on the main entry. The large cars operate in true shuttle service, traveling between loading point and hopper. They are of drop-bottom design.

The extending of the track into the panel, to enable the cars to reach the unloading station, was found undesirable and other means would have to be adopted to provide a gathering method which would be superior to the chain conveyor, belt conveyor method, in 7½-ft. coal.

At another mine we used a cable reel shuttle car. This had four-wheel drive and four-wheel steer, adaptable for use in close timbering, as well as on extreme grades and rough floor.

The installation of cable reel cars presents a considerable problem when operating two of these behind one loading machine. We tried to solve this problem by using only one shuttle car. To compensate, it was necessary to shorten the travel distance. To do this, we decided to work the one car in straight-line shuttle service between loading machine at the face of the room and discharge point at the neck of the same room.

The manufacturer provided an elevating tail discharge so that the car could be loaded by the loading machine at one end and the pay-load discharged from the elevated tail by drag-flights.

The result was very gratifying, and the short haul, quick discharge and return did compensate to a large extent for the absence of the second shuttle car.

After various experiences, we decided to assemble the advantages of various methods into a new layout. This utilized straight-line shuttle service from face of room to panel entries. Mother belt conveyors in panel entries replaced the track. Mother belts would discharge into large mine cars on main entry which in turn would carry the product to the hopper, after which it would be fed by a reciprocating feeder onto the main belt, which conveys the product to the surface and into the preparation plant. To correct "slug loading" a plural number of loading units are located in a panel and several shuttle cars are unloaded onto the same belt.

A final method is one wherein the rooms on the panel are driven in the same direction as the entry itself and are connected with the panel entry by key-cuts which may be placed according to the lay-out of the operator. Straight-line shuttle service may be utilized in these rooms, discharging onto a belt in the key-cut which in turn discharges on a belt in the panel entry. The key-cuts can be spaced, say, at 500 ft. centers. The straight-line shuttle service in rooms would go in for slightly over 500 ft., after which the key-cut belt conveyor would be moved up, shortening the shuttle haulage.

We are confident that with the proper application of the present available equipment we can maintain the necessary production in spite of the ever-increasing manpower problem.

Shuttle cars have assisted measurably in solving the problems of wartime manpower shortage

Gathering Haulage

Large Savings Can be Made in This Phase of Coal Haulage if Proper Study is Made of the Influential Factors

By P. R. PAULICK
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Library, Pa.

FOR the purpose of this paper and to confine the discussion strictly to gathering haulage, it is assumed that proper track layout, power supply, face preparation, etc., conforms to best operating practice. If this part of the mining system is faulty, the productivity of mechanical loaders suffers in direct proportion—regardless of the gathering haulage used.

Mine car gathering haulage is the oldest and most common medium for direct gathering of coal from mechanical loaders. In this type of haulage, the track cost will range from 4 to 16 cents per ton depending upon coal height, reclamation system, re-use of track material, etc. For several years this cost item was an open target for arguments against track haulage, and for awhile there was a definite trend away from this type of haulage. But because we are limited in the liberties we can take with mining system layout due to roof and other natural conditions, and because of the continued development of large capacity track cutters, and track loaders, we find several large properties definitely reverting to track haulage system for their mine mechanization programs. They are depending upon the combination of large capacity fast tramming track mounted cutting and loading machines, large capacity mine cars, and fast car change to attain satisfactory results. To attain the production benefits of large mine car haulage, transfer cars were developed and used only within the confines of a working section.

Shuttle cars are a special mine car. By replacing the steel wheels with rubber tires, installing a conveyor and removing track from the rooms, a flexible mining system was developed. The use of this type haulage system is limited to mines where the mechanical loaders are also mounted on rubber tires, or on caterpillars.

Since the concentrated mine mechanization program was inaugurated, size and capacity of mechanical loaders has been progressively increased. Loaders now in use have a loading capacity in excess of 8 tons per minute. Any increase in loader capacity is not as a rule accompanied by a corresponding increase in the total daily production from the loader, unless large capacity mine cars are also installed at the same time.

While the design and construction, and even the application system differs for each of the three types of gathering haulage mediums mentioned, they all have one purpose in common: service the mechanical loaders so as to obtain maximum potential productivity. However, with present and future tonnage demands, we are told that it is not enough to just maintain so-called maximum production, production must be increased.

I have seen car changes made at the astounding average rate of 20 seconds per change maintained over a period of several days. I have also seen them require over two minutes.

I have accumulated interesting data on all types of mechanical loaders. Summation and analysis of these data shows that the average work day of an average mechanical loader is divided thus: tram with loader 9 percent, load coal 40 percent, change cars 30 percent, and all delays 21 percent.

To get larger daily tonnage per loader it is necessary to decrease the 30 percent car change time and add this saving to the 40 percent coal loading time.

A survey was made on mechanical loader capacities when using different size mine cars and results are shown above.

When contemplating a production betterment program it is necessary to have facts. Facts are best obtained from time studies. Time studies will disclose poor operating practices, delays restricting production, and suggest remedies or corrective measures necessary. *However, any time study is only as good as the man that makes it.* It is necessary to time study the loading operation in detail, not just loading time per car. Break the operation down into its elemental component parts: load coal, dig coal, maneuver loader both during loading and during car change time, exclude all foreign elements such as derailments, breakdowns, handle slate, set and reset post, etc. Time study the car change time in detail. Time study the cutting, drilling, shooting and in fact all the preparation phases of the working cycle. Here, too, segregate and eliminate all delaying influences. In short, time study everything in detail.

Analyze the whole operation and rearrange the working elements so as to eliminate or reduce to the smallest percentage possible all factors which adversely affect the operation and prevent the attainment of maximum tonnage possible from the mechanical loaders. Everything must be subordinated to the loading units.

Generally speaking, belt conveyors are not used as primary production units, but have been developed simply as a very efficient system for taking away the coal from the production units themselves. Belt conveyors 30 in. or less in width are used very extensively for primary gathering haulage from chain and shaker conveyor setups, and some special trackless mining systems. My guess is that more than 1,000,000 ft. of this type of belting is in use today.

The guiding theme of this paper has been the ways and means of reducing the 30 percent non-productive time spent on car changes by the mechanical loaders, and to convert this saving to productive time. With ordinary mechanical loaders this can be done by increasing the size of mine car, or by reducing the car change time, or both. In chain, or shaker combination belt conveyor mining system, car change time has been reduced practically to zero.

Car Size	Cars Per Shift	Tons Per Shift	Percent Change Time	Percent Load Time
2-ton	165	330	27.8	37.6
3-ton	160	480	26.0	39.0
4-ton	132	528	23.5	47.5
5-ton	110	550	22.0	57.0
6-ton	99	594	19.7	58.5
10-ton	70	700	14.0	70.5

Complete proceedings of the Coal Mine War Conference available in the 1944 Coal Mine Modernization Year Book. Place your order NOW.

An Unsolved Problem of Thin-Vein Mining

Some Situations Offer Stubborn Refusal to Satisfactory Economic Solution and Cannot be Met With Ordinary Methods and Equipment

By L. E. YOUNG
Consulting Mining Engineer

MUCH can be learned by studying problems that have not yet been solved in mechanizing mines. Sometimes we have installed mechanical loading devices where conditions have not been suitable; sometimes it has been necessary to discontinue the use of equipment not rugged enough for conditions prevailing; sometimes roof or floor conditions have been unfavorable. Sometimes the responsibility of getting out daily tonnage with regularity has been more pressing than continuing to work with new equipment and new methods and trying to solve problems of the future.

A problem submitted for discussion is that of mining a thin bed of bituminous coal safely and at reasonable cost under the following conditions:

1. An upper seam has been mined extensively. General data: drift mine; coal loaded by hand into mine cars; block system with 22-ft. rooms on 80-ft. centers; pillars recovered by retreating in the panels.

2. The 40" coal seam discussed lies 40 ft. below upper seam.

3. Most of the upper mine water can be drained toward outcrop or pumped to drainage. There are many local sags in which water accumulates some 5 ft. deep and 2,000 ft. across. In general, the upper mine is well-drained except for accumulation of water in abandoned gobs.

4. The upper mine floor is generally firm. There have been no squeezes—no heaving of the floor. The thickness of the measures between the two seams ranges from 31 to 53 ft. There is hard, massive sandstone of varying thickness between the beds.

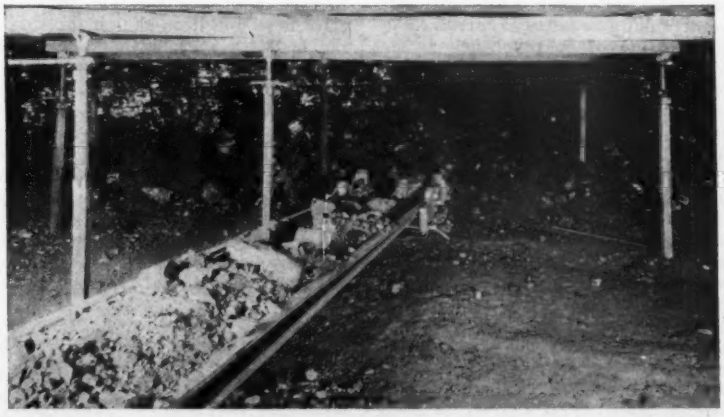
5. The immediate roof in some of the areas of the lower seam consists of laminated shale of variable thickness; some areas have good sandstone roof. Where roof is laminated shale, it must be cross-barred or taken down.

6. The floor of the lower seam is generally hard, but locally consists of fireclay and shale.

7. Entry-driving was started in the lower seam several years ago to mine the two seams simultaneously. Main and panel entries have been projected directly under entries in the upper seam, and there has been no extensive work immediately under areas in which upper pillars have been mined.

There is much water from the inaccessible old gobs to be handled in the lower seam. At present 17 pumps handle the water coming in from entry development.

8. It is now desired to speed up the entry-driving in the lower seam so that mining within panels may start as promptly as possible.



The problems of thin vein mining are numerous and varied. Many special tools have been developed for this kind of work

9. Various methods of loading have been used: hand-loading into cars; hand-loading onto conveyors; Joys loading into shuttle cars; shaking conveyors with duckbills.

At present, cross-barred entries are being driven using both shaking conveyors with duckbills and hand-loading on chain conveyors.

Water is the chief trouble encountered; it drips out of the roof, appears on the floor during undercutting, accumulates at faces unless removed continuously, and softens the bottom. The discomfort of working in the low height, and difficulty of operating and maintaining mining machinery continue in spite of strenuous efforts to improve conditions. The water in the upper seam is not a serious handicap to the loaders working there, but in the lower seam the mining under water-logged gobs has resulted in extremely difficult working conditions.

The average rainfall is 45 inches per year with about 4½ inches in July. The country is mountainous and normally run-off is rapid. It is estimated that the gobs have an area of at least 1,600 acres. Following complete mining, breaks generally extend to the surface, and overlying beds are pretty well broken over worked-out territory. A great deal of water enters the upper mine through these breaks.

The thick sandstone strata between the two coal seams have not as yet been broken by mining in the lower seam and the mining of pillars in the lower seam is not planned.

Plans and Methods Considered.

1. Entries are being driven directly under those in the upper seam.

2. Active mining in the lower seam is not to be carried on immediately under the active workings in the upper seam.

3. In future, mining in the upper seam is planned to avoid leaving large gobs undrained above any panels to be mined in the lower seam.

4. Main entries in lower seam have been projected to drain water from upper seam, as mining in rooms will not be economical unless the panel is predrained. Holes drilled at regular intervals along entries, through the overlying sandstone, into the upper seam would probably be too expensive.

5. Track cutting and track loading machines have been suggested for use in wet sections, if suitable equipment is available for the working height anticipated.

In inviting suggestions on best practice to follow, it may be well to restate the problem, which is: mining under the foregoing conditions of the two seams *safely, simultaneously, now,* and *at reasonable cost.*

Handling Rock In Thin Coal Seams

Machinery and Methods are Deserving of Much Study in the Solution of Particular Rock Handling Problems

By WATSON STOREY
Assistant Chief Engineer
United States Coal & Coke Co.

PRACTICALLY all methods of coal mining involve some rock work. In addition to slate handling, it is necessary to take rock by brushing either top or bottom so that the main haulage roads may be laid to the most advantageous vertical alignment. With conveyor mining in thin seams, there are other factors of equal or greater importance which have to do with sufficient vertical clearance to permit transportation and adequate mine ventilation. The unit rock work ratio over tons of coal produced becomes a problem demanding serious consideration.

This paper assumes that over large areas, rock work for most systems will be nearly equal. Where mining operations are confined to relatively small areas, limited by small capacity, in seam thickness of 36 inches or greater, rock work can be kept to a minimum by use of conveyors.

The transporting conveyor handling larger tonnage over longer distance requires suitable vertical curves to assure nesting of conveyor belt in the troughing carriers and permit belt training. In badly undulating seams it will be essential to brush to permit good conveyor installation. While the amount required for such an installation is comparatively small, it will be noted that, because of low head room, small, easily handled equipment will maintain labor efficiency. Small air compressors and jack hammers are generally used for this type of work. The most convenient time for this work is prior to installation of the belt conveyor, and if the development headings are being driven with shaker conveyors, a duck-bill can be used for mucking rock. The amount of rock work required for alignment of conveyors should not exceed 5 percent of the total amount of all rock work.

To safeguard lives and property it is essential to sweep the mine workings with sufficient air. Sinking of air shafts to seams overlaid with heavy mountain overburden is impractical and under such conditions ventilating currents must be forced through long airways when mine workings are extensive. To keep the pressure of the ventilating fan within economical limits, airways are enlarged by removing coal and rock. Brushed airways also function as an auxiliary escapeway.

Cost of mining thin seam coal limits the amount of slate which can be handled at the working face. Where it becomes necessary to handle more than a few inches of drawslate, production costs generally exceed the market value of the coal. If the drawslate comes down with the coal and breaks into small pieces, cost of handling increases. However, this will not be objectionable if there is a mechanical cleaning plant on the surface. Where the coal is hand-loaded onto face conveyors, and combines with product from other working places on a gathering conveyor, the only satisfactory method of handling the drawslate is to gob it on the out-by side of the face conveyor, by hand-shoveling.

The method of rock work will to a great degree depend on the mining method. There are three schemes in general practice: (1) By advancing the entry in coal far beyond the site of mucking operations and drilling vertical holes in the rock to be taken by hand-held, light-weight jackhammers. (2) Combining rock work with the advancing entry in coal by first taking a cut of coal, then a cut of rock, the rock drilling being done with post-mounted power-feed drills of the drifter type. (3) Similar to the first method except a track-mounted drilling unit is used to drill horizontal holes.

In the first method the main advantage is the ability to separate the rock work from coal production in advancing entries and the mucking operation from the drilling. In the second method, if the bottom rock is lifted it will be necessary to use a universal cutting machine for the coal mining operation, or, if a shortwall machine is used, it will be necessary to keep the coal cut far enough ahead of rock work to permit stabling the mining machine between the advancing coal face and the rock face. The third method is very similar to the first, with the exception of drilling and shooting. Larger drills can be adopted for faster and more efficient drilling.

Under System No. 1, experience has proven that, in low coal, where it is

Two electric drills are mounted on a gathering locomotive to make a mobile drilling unit

necessary to use small jackhammers, one driller and helper will average 75 lineal ft. of hole per 8-hour shift, or 150 lineal ft. for two drillers and one helper. System No. 2 is based on a three-man crew. Three men, when working under this system, will drill at the rate of 20 minutes for each 6-ft. hole, or one hour per round of three holes. Loading and shooting will require an additional 15 minutes for the three holes.

System No. 3 is based on: Tramming drilling machine to and from face, 10-20 minutes; drilling, 40-60 minutes; loading holes and shooting, 15-25 minutes.

When two entries are being brushed, one three-man crew does the drilling and shooting, and another three-man crew is used for the mucking operations. This arrangement is easily coordinated as the drilling and shooting require approximately the same time as the mucking.

All present accepted mining methods involve some rock work, which is reflected in the over-all cost of production. The increased amount necessary in connection with conveyor mining represents a significant portion of the cost of mining thin seam coal. Accordingly, the mine operator must accomplish this dead work as economically as possible to compete with coal originating from thicker veins. We are convinced that the problem is worth continuous study by both mine management and builders of equipment, with the view of designing machines which perform this work with maximum efficiency.

Conveyor Mining Under Tender Roof

A High Percentage of Extraction is Being Maintained in Spite of a Wide Range of Adverse Conditions

By T. E. JENKINS
President
National Fuel Co.

THE coal produced at the Eagle Mine is rated Sub-Bituminous and finds market chiefly in Denver and neighboring towns. The mine is served by rail and is also prepared to furnish coal to trucks.

It has been necessary to provide this mine's natural market with a clean, well-sized product, with particular emphasis devoted to production of large solid lump of 2½-in., 4-in., and 8-in. sizes (about 60 percent of the output).

Annual production is approximately 200,000 tons, even with an acute labor shortage, inexperience of labor available, and abnormal absenteeism.

This mine was laid out for shaker conveyor and duckbill. The controlling factors were:

1. Coal reserves of this district are extremely limited, necessitating maximum recovery. It was necessary to plan for complete extraction. Extraction to date has been slightly better than 92 percent.
2. Rapid development was essential to quick, high production to assure holding existing market.
3. The tender roof and 365 ft. of loose cover prevented opening up sufficient rooms, on any one-room entry, to provide enough working places for the economical use of any other type of *fully mechanical* loading device.

Since 800 tons production was necessary as quickly as possible, room and pillar mining was necessary in the section west of the main north entry before the boundary objectives were reached.

It was determined that no more than one single room could be worked at a time on *any* room entry. This means that only one shaker and duckbill unit can operate on any room panel entry, because the top is excessively tender and heavy. Immediately over the coal lies 13 to 18 ft. of soft, soapy shale, thinly laminated. From this shale bed to the surface are no hard strata. The shale over the coal will cave almost immediately when support is removed. If a room starts to cave, it is almost impossible to stop, even though only one room at a time is opened up. This condition is helped immeasurably by the use of shakers and duckbills, due to the rapid extraction of room and pillar coal from only one face per panel entry.

The coal seam is from 6½ to 9 ft. thick. From 12 in. to 18 in. of coal top is left above all entries and rooms to provide support to the top and to keep the air away from the shale over the coal.

Rooms are driven up 24 ft. wide, with the conveyor line up the center. The pillar between it and the last ad-

Tender roof prevents operating with large open areas

jacent caved room is 15 to 16 ft. thick. No room crosscuts are driven through this pillar. No other rooms are started on this until this last room is up to its limit. A second room is then driven up 300 ft.

The detail of pulling the pillars is as follows: Two machine cuts will cut through the 16-ft. pillar. When the room is driven completely up to its 300-ft. depth, a slabbing cut or "skip" is made for about 30 to 40 ft. along the pillar rib. The conveyor line is then swiveled over and cut loaded out. A second cut or skip is then put in, which cut breaks through to the adjacent caved room. A solid row of breaker props is then placed across the end of the remaining pillar and room and enough props are then removed from the pillar section just mined, and the room, to cave the place up to the breaker line.

This plan of mining does not permit the concentration of two or three conveyors working adjacent to each other and discharging on to a "mother" or gathering conveyor. This system cannot be applied without the loss of most of the room pillar coal. Ventilation of the rooms is by blower fans and vent tubing. Blower is placed in the intake air course, at least 20 ft. from room neck. All blowers, conveyor motors, starters, and trolleys are placed in intake air course on room panels. No more than three conveyors are operated on any one split of air from main intake, and all air returning from each room entry panel goes directly to main return air course, without any chance of recirculation. It is impossible for air to move from one room panel to another panel. Recent air and gas samples show only 0.15 percent gas in the last crosscut at the end of the room panel entry, and only .05 percent in the main return. Cardox is used almost exclusively for blasting. It produces solid lump coal, free from fractures, and contributes to protecting the tender top.

The overall efficiency of this operation has been very satisfactory. For a period of several years prior to the present labor condition we were able to produce 8½ to 9½ tons per man shift, including all employes, inside and above ground and including all mine supervision, office force, shop force and preparation force.

It can be seen that the deepest room consistent with good ventilation and safety is very desirable to reduce the moves to the minimum. It is difficult to experiment along this line when panels are driven in advance according to plan and no change can be made except as new panels are driven. We are going to shorten the rooms in the Southeast corner, driving four panels where three have been driven from the Main South. We will be able to keep accurate cost records in this section as against other sections of the mine and be able to determine definitely whether it will pay to follow the new system or stay with the old.

The highly successful Coal Mine War Conference at Cincinnati culminated in a banquet of record attendance with Hon. Donald M. Nelson as speaker

Exploiting a Tri-State Zinc Mine Under Wartime Conditions—Part 1

Operations Meet with Many Reverses Due to Labor and Machinery Shortages. Shaft Sinking Methods are Described

By W. F. NETZEBAND
Mine Superintendent
American Zinc, Lead & Smelting Co.

THE Henckel-Smith mine of the American Zinc, Lead and Smelting Company is located in the Missouri portion of the Tri-State Mining District, about three miles southeast of the town of Duenweg. It is on a southerly extension of the famous Oronogo-Webb City-Duenweg field which produced the bulk of the zinc-lead ores of the Tri-State District prior to the first World War. This mine produces zinc ores only.

History of Development

Spasmodic mining of shallow lead and oxidized zinc ores had been carried on prior to the Company's interest in the property. Late in 1930, under the direction of the late G. W. Johnson, then District Manager for the Company, preliminary geophysical prospecting by Schlumberger Electrical Prospecting Methods of New York, indicated a number of shallow depressions in the limestone surface of the underlying Boone formation. Churn drilling the following year proved the accuracy of the depth finding ability of the geophysical survey, and indicated two small zinc sulphide ore bodies. No further work was done during the depression years, but the leases were kept active by the payment of rentals. Rising prices for zinc in 1941 revived interest in the property and in December, 1941, under the direction of John J. Inman, District Manager, churn drilling was resumed to delimit the indicated ore bodies. Leases were obtained on acreage to the north and west of the original 400-acre Henckel tract. This drilling extended the original north ore body (Henckel No. 1 Shaft) and partially developed a low-grade, low-face ore body on the 80-acre Smith tract adjoining the Henckel tract on the west.

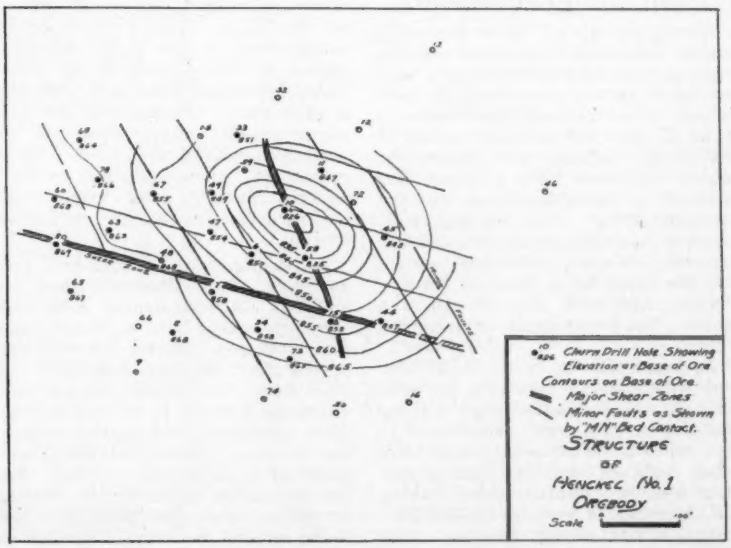
Late in July, 1942, authorization was granted to start construction work and on August 3, under the supervision of Ralph E. Calhoun, Assistant District Manager, work has started on reaming churn drill hole No. 59 for the installation of a deep well turbine pump, and ground was broken for compressor foundations on August 17.

Geology

The dominant structure in the area is the Joplin anticline which strikes about North 30 degrees West. The Henckel-Smith ore bodies lie on the east flank of the anticline and are controlled by minor flexures which have resulted in a zone of shearing roughly paralleling the anticline, and strong cross fractures trending approximately North 80 degrees West. Minor faults and folds control the ore deposition. From churn drill records, Henckel No. 1 ore body was interpreted as a basin structure with the low point centered around churn drill hole No. 10 and rising in all directions toward the periphery. The shearing and fracturing controlling this structure as determined from underground workings has been superimposed on this earlier interpretation for comparison.

The Boone formation of Mississipian age is covered by 20 to 40 ft. of residual clays and gravels. The top of the Boone formation in this immediate area is usually the Short Creek oolite member, which also marks the top of "M" bed as defined by Geo. M. Fowler.* In the Missouri area the "M" bed is 80 to 100 ft. thick, followed by 12 to 20 ft. of "N" bed, 25 to 35 ft. of Grand Falls chert ("O,"."P" and "Q" beds of Fowler) and 120 ft. plus of Reeds Spring formation.

The two main ore bodies on the Henckel tract are confined to the lower 25 ft. of "M" bed and upper 10 ft. of "N" bed, with some of the richest ore occurring at the contact of these two beds. The "M" bed consists of highly chertified zones interstratified with massive beds of gray to brown limestone containing numerous rounded chert nodules. The ore horizon is the typical breccia of the Tri-State District, except that much of the cementing material between the chert fragments is fine grained brown to black dolomite rather than jasperoid. The

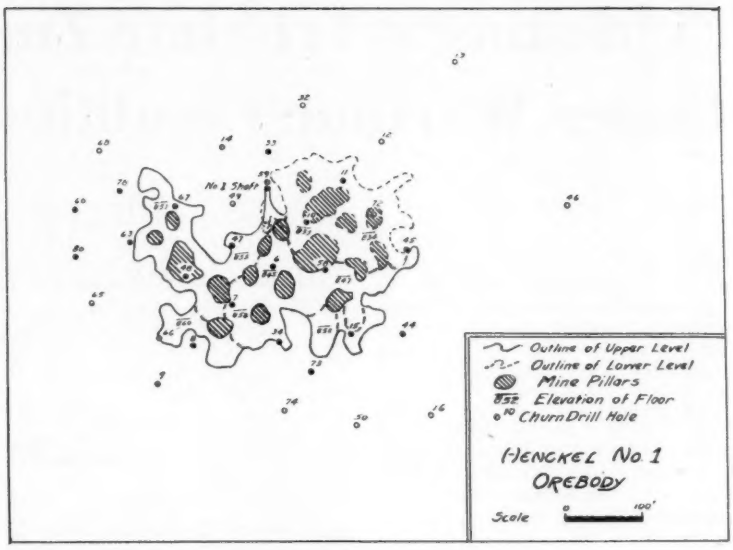


* Geo. M. Fowler; Tri-State Geology, Engineering and Mining Journal, Vol. 144—No. 11, November, 1943, p. 78.

"N" bed is composed of massive beds of blue or pale gray chert. This bed is barren except in the highly fractured zones where sphalerite fills the cracks and seams which have been opened by the local movements.

The Henckel No. 2 ore body is contained in the lower 10 to 15 ft. of "M" bed. Due to apparently intense local deformation, large clay-filled fractures have penetrated from the surface through "M" bed into the underlying "N" bed, and have permitted the inflow of meteoric waters which have oxidized the major portion of the ore body to zinc carbonate and silicate. Unusually rich cores of unoxidized zinc sulphide were cut in three churn drill holes, but their lateral extent was so small that they were soon mined out.

The "M" bed on the Smith tract to the west, and the western portion of the adjoining Henckel tract consists entirely of unaltered, massive limestones with numerous rounded chert nodules. The "N" bed consists of interstratified, thin beds of partially leached gray or blue chert and dense, dark gray or brown limestone. The commercial ore seems to be confined to the upper 6 to 8 ft. of the Grand Falls chert, probably "O" bed. A few scattered churn drill holes show light mineralization in the lower part of the Grand Falls chert, but the mineralization is too scattered to expect a commercial ore body at that horizon. The Smith ore body is apparently controlled by a minor flexure which has left the massive limestones of "M" bed unbroken. The zinc sulphide occurs filling cracks and vugs in the chert or disseminated throughout bands or lenses of brown dolomite. The dominant associated mineral is pink dolomite occurring as a crystalline encrustation lining small vugs or filling fractures in the chert.



Shaft Sinking Operations

Equipment of all types was very scarce, and in many instances the only equipment available would have been consigned to the scrap heap a year before. Two Ingersoll-Rand Imperial Type X, belt driven compressors of 599 cu. ft. capacity were finally obtained, but more than a month was required to recondition them and put them in service. One compressor is powered by a General Electric 100-hp., 440-volt, 60-cycle induction motor; and the other by a General Electric 100-hp., 2,200-volt, 60-cycle induction motor. The compressors are driven by V-belts.

As there was 20 to 30 ft. of clay and chert boulders overlying the solid rock, it was decided to start sinking the shafts with hand windlasses to that depth while the compressors were being installed and the sinking derricks erected. Contracts for sinking the three shafts were let to Ray Patterson, a local contractor—now mine foreman—and work commenced on Henckel No. 1 and Smith shafts on September 15, 1942. Work on Henckel No. 2 shaft was started two days later. The shafts were sunk to solid rock and cribbed by October 3, but it was not until October 30 that the compressors were finally placed in service and shaft sinking started in rock. In the meantime sinking derricks had been erected and 8 x 8 geared, single drum, air hoists installed in the derricks. The sinking derricks were so designed that, when sinking operations were completed, the hoist platform could be removed and the structure finished as a standard Tri-State headframe.

The shafts are 6 ft. by 6 ft. in the clear, inside the cribbing. This gives ample room for the 1,650-lb. cans which are 32 in. diameter by 32 in. deep, and allows room for the air, water and electric lines in the corners of the shaft. The normal drilling round used in the shaft sinking is shown in the accompanying sketch. Delay detonators were used, with from 5 to 7 sticks of dynamite per hole. Forty percent gelatin dynamite was used throughout the shaft sinking operations. Detonation was by No. 6 electric blasting caps, using either standard blasting battery or 110-volt current.

All drilling was by hand-held jackhammers. Three Ingersoll-Rand J-49 and two Gardner-Denver S-55 jackhammers taking 1-in., hollow, hexagon steel were used. During the early part of the shaft sinking, detachable bits were used, but regular forged cross bits were found to be satisfactory and were therefore used during most of the sinking. Heavy blasting mats made of logs, cabled together, were placed over the shafts during blasting. On several occasions these mats were blown against the floor of the sinking derrick, but no serious damage was done. Except for these minor mishaps, their use proved very effective in preventing damage from flying rocks. Each round was drilled 4½ ft. deep and broke from 2½ to 4 ft., depending on the character of the rock encountered. The average round broken was 3 ft.

During most of the sinking operations, three 8-hr. shifts were used, with a crew consisting of hoistman and two shaftmen. The shaftmen drilled, loaded, fired or mucked, depending on which operation fell on their shift. Because of the steady inflow of water, a continuous operation was necessary even though the graveyard shift was usually weak in work accomplished.

To better understand the conditions under which the shafts were sunk, each shaft will be described separately.

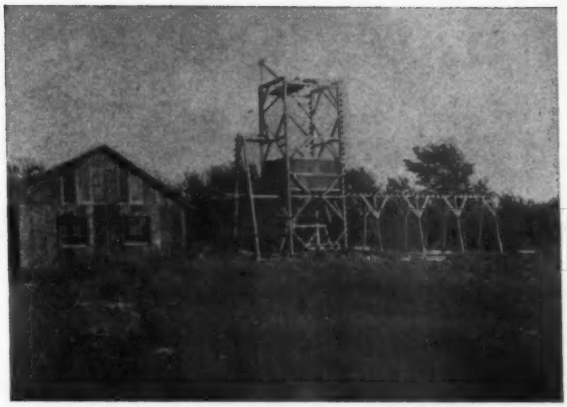
Henckel No. 1 Shaft

Henckel No. 1 shaft was located about 10 ft. south of churn drill hole 59 which had been reamed to 12 in. to receive the 7-in. Pomona pump powered by a 30-hp. Unidrive motor. This pump has a rated capacity of 500 g.p.m. The drill hole is 225 ft. deep and the pump suction was set at 215 ft. Thirty feet of clay with chert, gravel and boulders overlay the solid rock, so the shaft was cribbed solid with 2 x 6 pine timbers to 35 ft. After sinking a short distance into the solid rock it was soon apparent that the water entering the shaft would not drain to the pump hole and was too much to bail by hand. An Ingersoll-Rand No. 25 sump pump was installed and worked fairly satisfactorily but required frequent overhauling and repair. This is understandable, however, considering the amount of sands and slimes that were handled by the

pump and the abuse they received from the shaftmen.

Shaft sinking proceeded at a satisfactory rate from a depth of 35 to 85 ft., but at that point the solid limestone and chert gave way to a fractured, shelly chert and clay with occasional limestone boulders in the south and east walls of the shaft. The shaft walls were too shelly to stand without support, so it was necessary to resume cribbing the shaft at this point. This type of ground was difficult to drill and blast as the shots frequently went out into the shaft wall and brought in considerable excess rock and clay which had to be removed and the resulting opening filled with cordwood after cribbing. A rim of unbroken rock was frequently left on the two hard walls which required extra drilling and blasting. Thus four or more shifts were often required to complete a round which should have taken but two shifts.

To further add to the difficulties, the sump pumps were beyond their effective pumping depth and caused frequent delays in unwatering the shaft after blasting. A partial solution of this problem was drilling a 2⅝ in. jackhammer hole from the shaft into the Pomona pump hole and discharging the water from the sump pump into the Pomona pump hole. This, of course, was just postponing trouble, for the sands and slimes picked up by the sump pump eventually filled up the Pomona pump hole above the suction and necessitated pulling the Pomona pump and cleaning out the pump hole with a churn drill. This was not as serious as expected, for the pump hole had to be cleaned only twice before the shaft was completed. The sands and slimes caused some wear on the impellers and bowls, but it is only after more than a year's pumping that the wear has reduced the effectiveness of the pump to the point where the impellers and bowls had to be replaced.



Sinking derricks were designed for conversion to standard tri-state headframes after sinking was completed

The combination of unfavorable rock conditions below a depth of 85 ft. and exasperating water troubles greatly prolonged the shaft sinking beyond the estimated time. This increased the labor cost, in fact the labor cost alone nearly equalled the total estimated cost of the shaft. The cribbing of the shaft from a depth of 85 ft. to 154 ft. also added an unexpected material cost. The final cost of sinking the shaft was nearly double the original estimate.

At a depth of 154 ft. a 5 x 7-ft. development drift was driven south from the shaft. Some ore had been encountered in the east wall of the drift, but most of the drift was in partially leached limestone with numerous clay-filled seams and vugs. As the drift advanced the limestone swung to the west and at 30 ft. the entire drift was in ore.

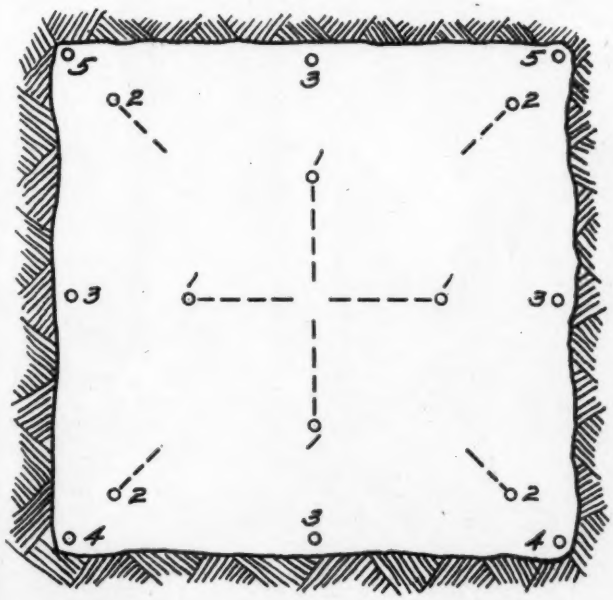
The shaft, meanwhile, had been completed to 171 ft. on January 27, 1943, and a lower drift driven off to the south at a depth of 169 ft. When this drift reached 35 ft. a raise was driven to connect with the upper drift and a hopper installed in the lower drift. At 20 ft. from the shaft a cross-drift was turned off to the southeast to exploit the lower ore indicated in churn drill holes 10 and 58. This drift encountered ore at 35 ft., where "M" bed pitched abruptly to the northeast along a strike trending North 30 degrees West.

Henckel No. 2 Shaft

Henckel No. 2 shaft was located approximately 700 ft. south and 250 ft. east of Henckel No. 1 shaft. Shurn drill hole 28 was thought to be just off the east edge of a limestone bar, so the shaft was located about 20 ft. to the northwest, in the expectation of sinking the shaft in unbroken limestone. This expectation was not realized, for at 55 ft. a large clay-filled fracture was encountered in the east wall of the shaft. This fracture permitted a heavy inflow of water which could not be handled with the sump pump, so sinking operations were suspended on December 15, 1942, pending the drilling of a 6¼-in. churn drill hole about 10 ft. east of the shaft, and the installation of a 4-in. Unidrive Pomona pump with a capacity of 250 g.p.m. The pump hole encountered several clay-filled openings below 95 ft. and it was necessary to set 6¼-in. casing to 133 ft. (1 ft. below the mine floor), bottoming the hole at 146 ft. The pump was finally delivered and placed in operation January 10, 1943.

Clay and silt from the numerous clay-filled openings drained to the pump and at times became so thick that the water could not get to the suction. It was necessary to connect a compressed air line to the pump discharge and thus clear the suction. Water was also run between the casing and the pump column, which helped thin the mud to a consistency the pump could handle. Two sump pumps were

(*Continued on page 77*)



Normal blasting round employed in sinking the Henckel-Smith shafts. Average "break" was 3 ft. in these 6 ft. x 6 ft. shafts

Strategic Mica*

War requirements stimulate production of domestic mica of strategic quality, formerly obtained mainly from India. An extensive educational and financial-aid program offered by the U. S. Government.

By G. RICHARDS GWINN
Associate Mineral Economist
Nonmetal Economics Division
Bureau of Mines

IN MODERN WARFARE, mica is truly indispensable. Coordination of combatant units necessitates maintenance of intricate communications equipment, in the construction of which high-grade sheet mica is essential. Scrap, ground, and the poorer qualities of block mica, which are less essential to the military program, are not considered in this paper. Furthermore, as the paper is designed primarily to assist mica miners, mica derivatives, such as splittings and films, also are excluded from discussion. The paper therefore relates solely to block mica of strategic quality.

Understanding of the many factors involved in marketing mica is definitely advantageous to mica miners.

Domestic Critical or Strategic Mica

Strategic mica, as redefined by the War Production Board on December 2, 1942, in Order M-101 as amended of that date, is block and punch mica in the rifted condition (partially or fully trimmed) that is of a quality better than black- or red-stained, free of cracks, pinholes, cross-grains, reeves, and ribs and relatively free of clay staining. It must be hard, clear, reasonably flat, and capable of being evenly and easily split into laminations or sheets of uniform thickness over the entire area, yielding sheets at least 1 in. by 1 in. in size. The heaviest demand at present is for sizes ranging from 1 in. by 1 in. to 2 in. by 3 in.

The term "strategic mica" is much used and often misused. Possibly a better term would be "mica of military grade," which would include all sizes and qualities of mica used in the manufacture of equipment for the armed forces. Strategic mica then would be the quality or sizes of which there may be a shortage at a particular time.

Contrary to popular belief in some quarters, "ruby" mica is not the only type wanted. Color alone is no sure criterion of value. It is true that virtually any clear ruby-colored mica will be found to have a sufficiently low power-factor loss for satisfactory use in condensers, whereas the power factor of clear mica of green or other dark colors varies from deposit to deposit. The mica from some of these deposits has a loss too high for satisfactory use in condenser films. However, there are other important strategic uses for mica that is unsuitable for condenser uses. Both block and punch micas of strategic quality prepared according to the customary domestic standards are wanted, and large quantities of strategic mica are needed. Punch can be utilized to best advantage for war purposes if miners will prepare it in accordance with the advice and assistance made available by the Colonial Mica Corporation. The blocks should be sound, level, with edges not shattered or opened, and as free as possible from such defects as splits, knife cuts, creases, wavy laminae, or rock punctures.

Stimulation of production of the grades and qualities of mica required for nonmilitary purposes is not part of the program of the Mica Section of the War Production Board or of the Colonial Mica Corporation. The War Production Board is confining its efforts to deposits that will produce worthwhile quantities of critical mica.

A peculiar combination of physical properties (perfect cleavage, heat and electrical resistance, flexibility, and elasticity) makes mica indispensable for use in condensers, electrical generating and motive equipment, radio tubes, and certain airplane spark

Scrap mica is so irregular in size and quality that it is suitable for grinding only. (Meyer and Brown Mica Mine)

* Abstracted from Bureau of Mines Information Circular 7258." Revision of Inf. Circ. 7219.

INTERIM REPORT

On the Progress of the

HEAVY-MEDIA SEPARATION PROCESSES

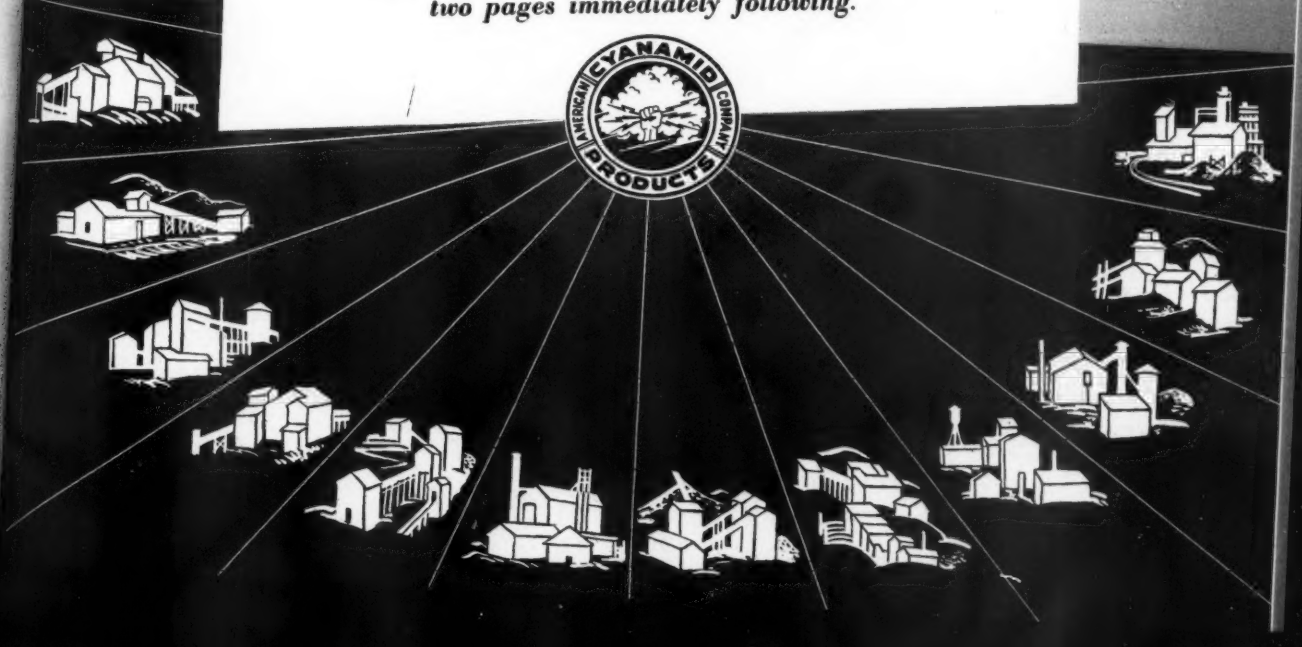
offered by CYANAMID

14 HEAVY-MEDIA SEPARATION PLANTS **using processes offered by Cyanamid have been installed. Of these, six have been completed within the past year.**

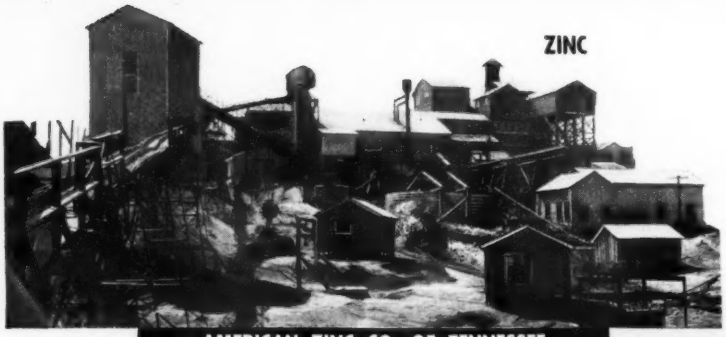
7 METALS and NON-METALLICS **are now being beneficiated by Cyanamid Heavy-Media Separation Processes. These include Iron, Zinc, Lead-Zinc, Fluorspar, Tin, Magnesite and Garnet.**

3 PROCESSES USED**—Ferrous Media, Non-Ferrous Media and Fine-Ore Concentration These processes are described in detail in Ore Dressing Notes No. 11 and 12, copies of which are available on request.**

The scope of Cyanamid Service in the application of Heavy-Media Separation is described in the two pages immediately following.



ZINC

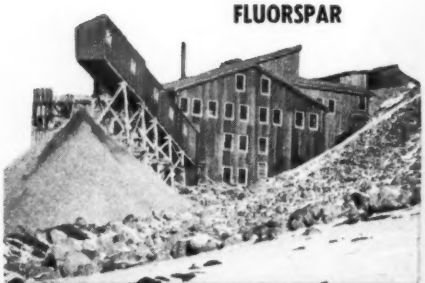


AMERICAN ZINC CO. OF TENNESSEE

TIN

CIA MINERA DE COLQUIRI

FLUORSPAR

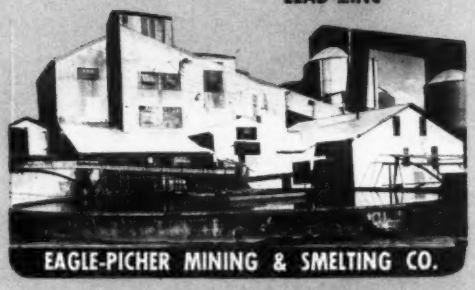


WESTERN FLUORSPAR CORPORATION

Cyanamid offers the unduplicated combination of twenty-seven years of world-wide ore dressing experience *plus* the mining industry's longest and broadest background in the application of Heavy-Media Separation, whether used alone or in conjunction with chemical beneficiation.

In the re-examination of present flow schemes and the study of your post-war milling problems, this composite experience is made available through an integrated service that includes the testing facilities of the Cyanamid Ore Dressing Lab-

LEAD-ZINC



EAGLE-PICHER MINING & SMELTING CO.

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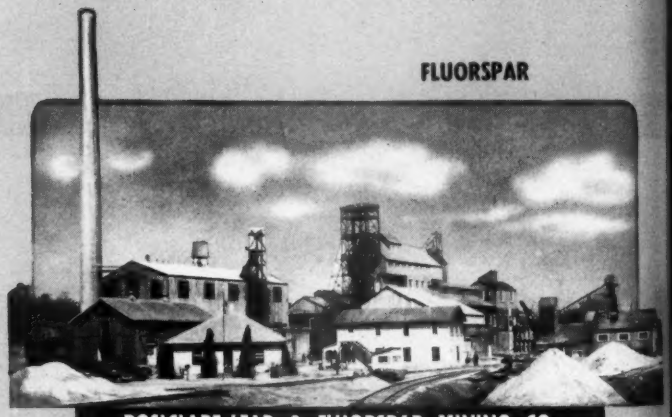
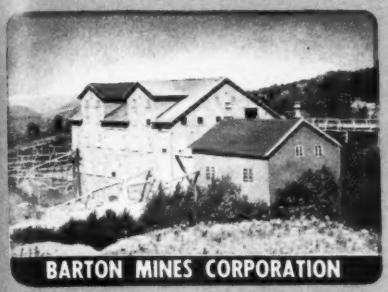


ROSICLARE LEAD & FLUORSPAR MINING CO.

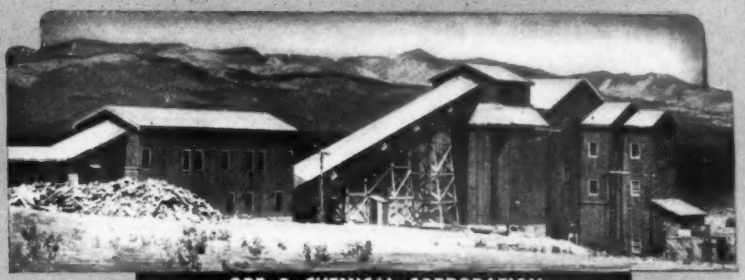
AMERICAN CYANAMID COMPANY

GARNET



BARTON MINES CORPORATION

LEAD-ZINC-SILVER



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oratory with its Chemical, Physical and Microscopical Departments; Cyanamid's complete line of Reagents and Processes; and the practical help of Cyanamid Field Engineers working with you in your mill to develop the combination of processes and reagents for highest recovery at lowest cost.

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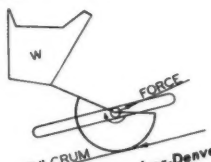
→Actions Speak Louder Than Words

...when it's a GD-9 Loader

Making tough jobs easy — cutting costs — delivering extra performance — those are actions of the GD-9 Mine Car Loader that speak louder than words.

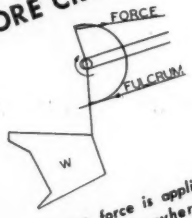
Because it gets the muck out faster, the GD-9 speeds up the job through the entire operating cycle — makes manpower more productive.

BETTER LIFT



The famous Gardner-Denver fulcrum principle increases lift. As filled dipper is raised clear of muck pile, application of force changes to midpoint of the rocker and accelerates speed of dipper as it nears discharge position.

MORE CROWD



At start, force is applied to top of rocker where it is needed for greater "crowding action" in filling dipper. Small, effective diameter of nearly empty winding reel adds power.

MORE POWER

The GD-9 is equipped with two powerful five-cylinder radial air motors to provide plenty of power for crowding into the muck pile and getting a full loaded dipper every time.

CLEANER DISCHARGE

Because the Gardner-Denver fulcrum principle accelerates the dipper as it nears the discharge position, the GD-9 sends the cars out fully loaded. No time and effort wasted hauling partly loaded cars.

LOW MAINTENANCE

All the vital operating parts of the GD-9 are sealed against the entrance of dirt and water and run in a bath of oil. Alloy steels are used throughout — heat-treated or hardened where greater strength is needed.

Send for illustrated, descriptive bulletin on the Gardner-Denver GD-9 Mine Car Loader. Write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER

MAKES AIR Cost Less AND Do More

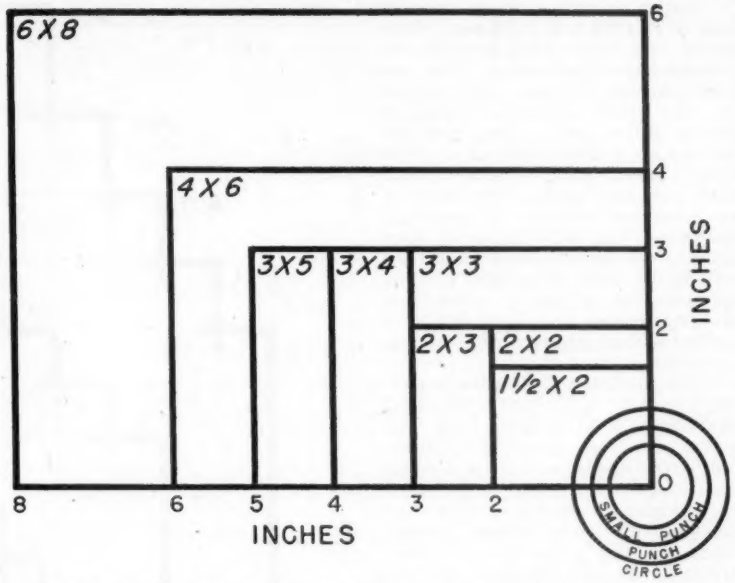
Since 1859

plugs. The forms of mica urgently needed for the war program are transmitting, receiving, and trimmer condenser films, radio-tube bridges and supports, cigarette films and nose washers for airplane spark plugs, and magneto condenser films.

Block mica must be free of structural imperfections (cross grains, cracks, reeves, and ribs) and mineral inclusions (black or red spots, mineral stains, or streaks) to have strategic importance, because imperfections cause the mica to split unevenly, and inclusions reduce its electrical resistance and raise its power factor.

The structural imperfections that ruin otherwise good sheets of mica are designated by such descriptive terms as "ruled," "ribboned," "tangle-sheet," "herringbone," "A," "horsetail," "feather," "wedge," and "hair line." If inclusions are present, the mica may be described as (1) heavy-stained, (2) red-stained, (3) clay-stained, (4) light-dotted-stained, (5) black-spotted-stained, and (6) black-stained. Mica may be "rum," "ruby," "white," "smoky," green, light green, or silver-black in color.

Mica moderately stained with metallic oxides may be satisfactory for some dielectric uses, but mineral staining of any type renders it unfit for use in electrical condensers. The presence of numerous small air bubbles makes mica unsuitable for condenser use. Large air bells may be removed by careful splitting. Clay-staining occurs in mica only near the surface of deposits and renders it suitable only for scrap. A chemical analysis of block muscovite mica affords no indication of its commercial value or possible use.



Simplified chart for domestic mica showing only one rectangle for each area grade

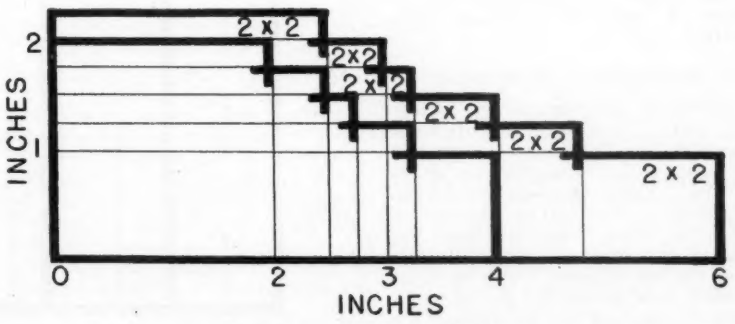


Chart for grading 2- by 2-in. Mica

Specifications

The specifications of strategic mica change frequently. Formerly, only slightly stained was acceptable for a specific purpose; now, good-stained and even stained are being used. Some domestic mica, heavy-stained to stained according to the Indian standards, has definite strategic use because of its high degree of flexibility. (These degrees of staining are defined in a later section of this report under "classifying.") It contains no mineral inclusions, but a host of microscopic air bubbles.

The specifications vary with use. For high-grade condenser work, a low power factor is the determining element. In electrical-power generation, dielectric strength and resistance to heat are important. For "cigarette" mica used in aviation spark plugs, flexibility is one of the deciding factors. "Cigarette" mica consists of films less than 1.2 mils in thickness that can be rolled around a ⅛-in. spindle without cracking or tearing and be free of pinholes and hairline cracks. Nose washers on airplane spark plugs are made of high-heat-resistant phlogopite mica. Good condenser mica should have a power factor of 0.03 percent or less. A good dielectric mica should withstand at least 1,000 volts per mil of thickness of 4 to 6 mils when tested with 2-in. plate electrodes. Almost any mica will withstand 500° to 600° without appreciable change.

Economic Considerations

Some mica mines produce only scrap mica suitable for grinding, but others produce scrap and variable percentages of sheet and punch. The ratio of production of sheet to punch is important to any prospective producer, as is the relationship of sizes and qualities, because profitable operation may depend on marketing considerable quantities of low-value punch.

The yield of usable block mica varies considerably in different deposits but is always small. Generally, 2 to a maximum of 6 percent of the total rock is marketable as raw block mica. A considerable part of this is salable as punch and circle mica, and a minor amount as rectangular block mica. Cobbing, rifting, and trimming eliminate 50 to 70 percent, and most of the resultant material may be the smallest size—1 by 1 in. Rarely more than 15 percent will be 3 by 4 in. and larger, and there is also the possibility of a large percentage of the sheets being heavy-stained or otherwise unsuitable for critical needs.

Mica mining, particularly if conducted by inexperienced operators, involves great financial risk owing to the irregularity of the borders of the pegmatites and the erratic distribution of the mica. These features dictate the size and shape of the openings and have an important bearing upon the mining method to be employed. The minimum size of shipment depends on the buyers' requirements and whether it is sold to a dealer

or broker, a rifting shop, trimmer shed, or directly to a consumer. Ordinarily, mica miners have three choices in disposing of their mica: First and most commonly, they may sell their entire "mine-run" output to a trimmer shed or broker; second, they may sell the roughly graded qualities of sheet to the trimmer sheds or brokers; and third, they may prepare the mica for the consumer market. It must be recognized that the quality of mica and its degree of preparation and grading will vary from mine to mine and from time to time from the same mine; therefore, it is impossible to guarantee fixed prices for the output of any mine.

The demand for sheet mica is governed largely by activity in radio transmitting and receiving fields and in the electrical power-development field. Construction activity is a rough index of activity in ground mica. Since the Colonial Mica Corporation has come into existence, demand, prices, and marketing procedure have changed. Present demand for the strategic qualities is very large, prices are at the highest level in our history, and the purchasing program of the Colonial Mica Corporation assures the miner a good price and a ready market.

Preparation for Market

Processes of preparation include (1) cobbing or sorting, (2) rifting or sheeting, (3) trimming, (4) grading by size, and (5) classifying as to quality. These are described briefly.

Cobbing.—Crystals or "books" of mica as taken from the mine are known as "mine-run," and ordinarily rock adheres to them. Cobbing is the process of removing the dirt and rock from the crystals and segregating the defective mica (scrap) from the crystals that will yield good block (cobbed mica).

Rifting is splitting the cobbed mica into sheets, usually 10 to 125 mils thick. A single- or double-edged 3-in. blade rifting knife is generally used in this operation, and its proper use involves considerable skill and experience. The products of rifting are (1) untrimmed block of mixed sizes, (2) punch and washer stock, and (3) scrap.

Care should be exercised in rifting to avoid breaking or tearing laminations at each point where the knife is inserted in the rough book. Much potentially useful mica can be spoiled or reduced in value by careless or inexperienced rifting.

Trimming.—Trimming of rifted blocks to remove ragged and tangled edges may be accomplished by knife, shears, guillotine, or fingers.

In domestic practice, ragged edges are broken from the rifted block mica with the fingers (thumb trim) or are roughly trimmed with a knife so that very little usable mica is removed.

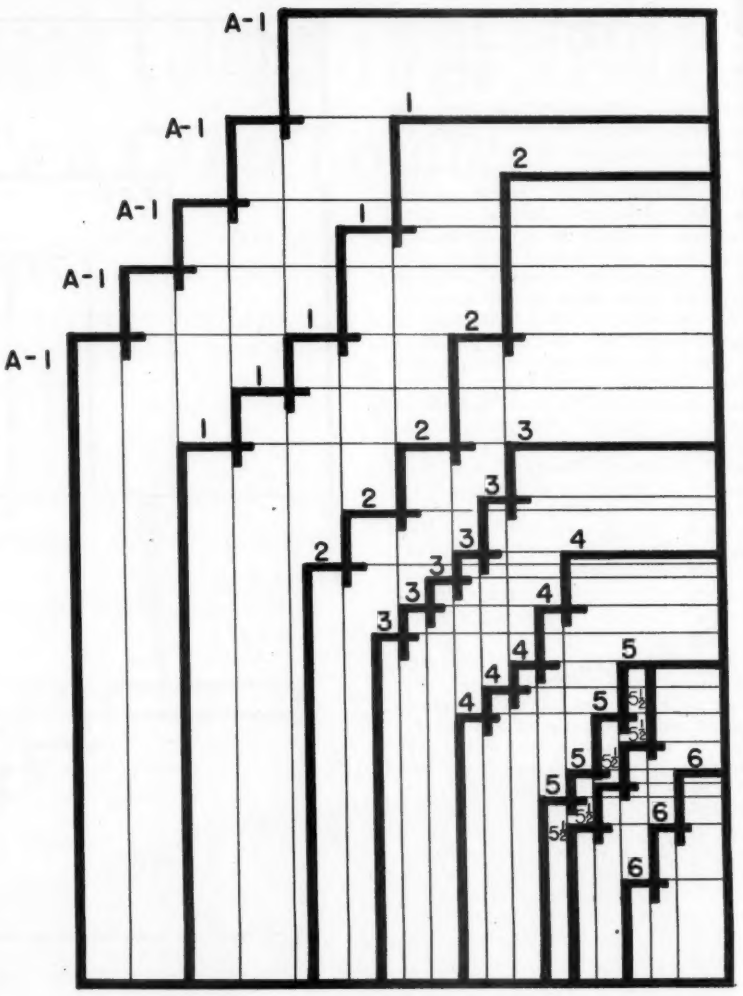


Chart for grading mica to Indian standard sizes

The domestic practice is based upon sound experience, as the manufacturers can cut the largest pattern of specific quality from the rough-trimmed block and still have trimmings from which to produce smaller patterns of lower quality; but mica thus prepared is difficult to appraise properly, because the defective or unsound mica area is different in each piece.

Knife trimming produces a smaller quantity of uncut or unmanufactured mica and a larger percentage of scrap than thumb trim. Because of the greater proportion of waste in fabricating thumb-trimmed mica as compared with knife-trimmed blocks, its value per pound is necessarily lower.

To be of maximum value to the consumer and the producers, all strategic sheet mica should be trimmed with beveled edges. The total area of any piece of sheet mica purchased by the Colonial Mica Corporation must not be greater than 2½ times the area of the largest rectangle, free of cracks, reeves, or crossgrains, that can be cut from the piece.

Half-trim mica is trimmed on two adjacent sides, with no cracks extending from the trimmed sides. *Three-quarter trim* is trimmed on all sides, with no cracks extending from two adjacent sides and no cracks extending into the pattern. *Full trim* mica is trimmed on all sides, with all cracks, reeves, and crossgrains removed.

Care should be exercised in handling and packing high-quality block mica, as the surfaces are easily scratched and the edges readily damaged by rough handling and improper packing. It should be packed securely in wooden cases and compressed to prevent shifting during shipping. The interior of the case should be free from projecting nails and rough surfaces.

Grading.—Domestic mica is graded upon the basis of the largest usable rectangle of specific quality that can be cut from the block, although the edges may be heavy-stained or other-

wise defective. It is important that the sound areas only of each block be considered in determining its grade size. The sound area of specific quality within the grade rectangle must be free of cracks, pinholes, cross-grained areas, etc. Domestic grading as to size is as follows: the smallest circular size, designated as "small punch," yields disks at least 1 in. in diameter; next size is "punch," which must be large enough to yield a sound circle 1½ in. in diameter if stained and 1¼ in. if clear. The next size is "circle," which yields disks 2 in. or more in diameter. Then follow the rectangular sizes or combinations equal in area to 1½ by 2 in., 2 by 2 in., 2 by 3 in., 3 by 3 in., 3 by 4 in., 3 by 5 in., 4 by 6 in., 6 by 8 in., 8 by 10 in., and larger, known as "sheet mica." Figure 1 shows these grade sizes graphically. Each size includes the designated dimensions and all larger sizes up to the next grade. A sheet 4½ by 7 in. would be classed as 4 by 6 in. Minimum size of electrical-quality sheet mica acceptable to the trade is 2 by 2 in.

Use of simplified grading chart.—The three concentric circles in Figure 1 show the minimum area of small punch, punch, and circle, respectively.

For rectangular or square blocks, place the mica so that the lower right corner of the sound area is at 0, the smaller dimension of the sound area extending along the vertical line and the larger dimension along the horizontal line. The largest rectangle on the chart that is completely within the boundaries of the sound area indicates the grade size.

In many instances it will be well for the miner to prepare a grading chart suited to his specific needs.

Colonial Mica Corporation will encourage the preparation of domestic mica of desirable qualities to full Indian standards by payment of a higher scale of prices. Miners interested in preparing their mica according to Indian standards should consult their nearest Colonial Mica Corporation field office to learn if their production is of a quality for which Indian trimming is desirable and to obtain a schedule of prices that would apply to their mica if so prepared and graded. Figure 3 is a chart for Indian grading of mica.

Classifying.—Exact classification of mica for quality is extremely difficult, because it depends somewhat on individual interpretations of standards. Domestic mica is classified upon the basis of the quality of the largest usable rectangle of sound area that can be cut from the block, although the edges may be heavily stained or otherwise defective, whereas by the Indian method the average quality of the entire piece is the basis of classification; many domestic miners who have not found it worthwhile to separate their block into several qualities will now profit by doing so because of higher prices being paid for clear qualities.

The American Society for Testing Materials has adopted the following standards of quality:

Clear.....Free of all mineral and vegetable inclusions, stains, air inclusions, waves or buckles.

Clear and slightly stained.....Hard, transparent sheets. Free of all mineral and vegetable inclusions, cracks, waves, and buckles, but may contain slight stains and air inclusions.

Fair stained.....Free of mineral and vegetable inclusions and cracks, hard, contains slight air inclusions, and is slightly wavy.

Good stained.....Free of mineral inclusions and cracks but contains air inclusions, some vegetable inclusions, and may be somewhat wavy.

Stained.....Free of mineral inclusions and cracks but may contain considerable clay and vegetable stains and may be more wavy and softer than the better qualities.

Black stained or spotted.....Same as stained, but contains mineral inclusions.

Black stained is sometimes separated into four qualities or classes. They are, in descending order of quality, showing increase in degree and distribution of staining: (1) Heavy stained, (2) light dotted, (3) black spotted, and (4) black stained. Black stained contains varying proportions of iron or other metallic oxide in stains, streaks, or spots.

Domestic and Indian grading (by size), approximate comparison.

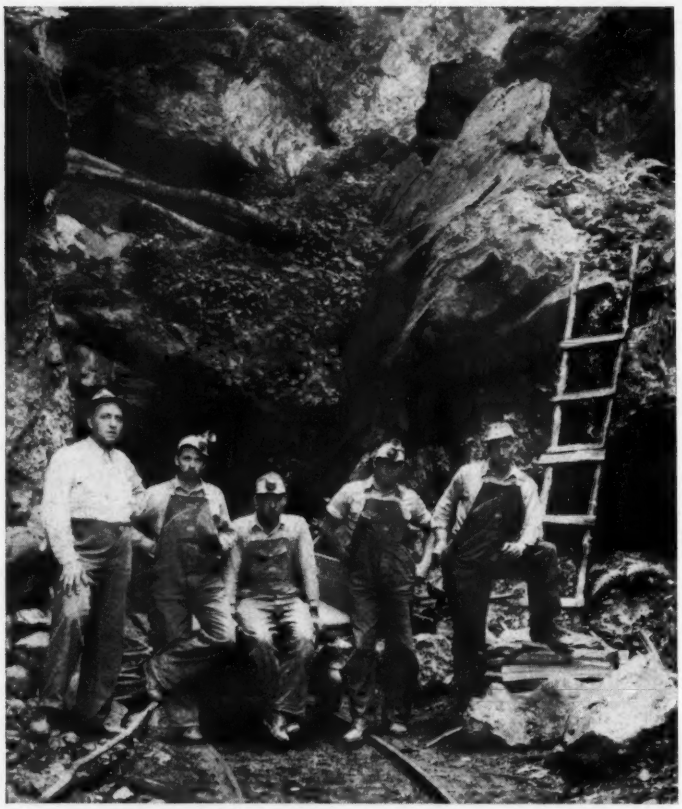
Usual domestic grades	Area (in single rectangle), sq. in.			Standard Indian Grades
	Minimum		Maximum	
Small punch	1	to	1½	
Punch	1½	to	2½	No. 6
Circle	2½	to	3	No. 5½
1½ by 2 in.	3	to	4	No. 5
2 by 2 in.	4	to	6	
2 by 3 in.	6	to	9	No. 4
3 by 3 in.	9	to	12	No. 3
3 by 4 in.	12	to	15	
3 by 5 in.	15	to	24	No. 2
4 by 6 in.	24	to	36	No. 1
	36	to	48	No. 1A
6 by 8 in.	48	to	64	Special
8 by 8 in.	64	to	80	Extra special
8 by 10 in.	80	to	96	Extra-extra special

NOTE.—In domestic preparation, only approximately 20 percent of domestic "punch" may be trimmed to Indian No. 6 grade, but approximately 75 percent of the larger domestic sizes may be recovered as the corresponding Indian grades. Size 6 is divided into small, regular, and large. Small punch is equivalent to the No. 6 small.

Grading according to Indian standards limiting dimensions.

Grade	Width, inches		Length, inches	
	Minimum	Maximum	Minimum	Maximum
6	0.5	1	1	2
5½	.75	1.5	1.5	3
5	1	1.7	1.7	3
4	1.5	2.5	2.5	4
3	2	3.2	3.2	5
2	2	3.7	3.7	7
1	3	4.9	4.9	8
A-1	4	6.0	6.0	9

Mica sheeting operations at Cloudland mica mines



Portal of the Cloudland mica mine, Mitchell County, N. C.

Approximate Comparison of domestic and Indian classification

Strategic

Unusual domestic qualities	Standard Indian qualities
	Clear.
	Clear and slightly stained.
	Slightly stained.
	Fair stained.
No. 1 Clear	Good stained.
No. 2 Clear	Stained.

Nonstrategic

No. 1 Electric	Heavy stained.
No. 2 Electric	Light dotted. Black spotted.
No. 3 Electric	Black stained.

Best quality heavy stained is being employed for strategic purposes, and attempts are being made to utilize this type to a greater extent. The domestic clear micas, as commonly prepared, represent a mixture of qualities according to the Indian standards. Thus, the "No. 1 clear" domestic is ordinarily equivalent to a mixture of Indian qualities averaging approximately "good stained" to "fair stained"; "No. 2 clear" is equivalent to "stained A and B Brazilian."

Prices

Mica is marketed in a confusing variety of sizes (grades) and classes (qualities) ranging in value from a fraction of a cent a pound for small, stained, imperfect flakes or scrap to over $20 a pound for exceptionally large, flat, clear crystal sheets. Not only does marketable mica vary greatly in size (from small punch to 8 by 10 in. and larger), but for each grade there are at least nine different qualities, ranging from clear to black stained. Block mica is marketed as (1) thumb-trimmed block, (2) part-trimmed block, and (3) knife- or sickle-trimmed block.

The pound (avoirdupois) is the unit upon which the price of sheet mica is based, although finished condenser films, radio-tube supports, and certain other items usually are sold by the thousand pieces. Though value is based in general upon size and quality, prices of comparable products may vary considerably, as they are usually determined by individual bargaining rather than by fixed quotations.

On December 14, 1942, the Colonial Mica Corporation was made sole buying agent for domestic strategic mica. Though value is based in general upon size and quality, the abundance or shortage of particular sizes or qualities has a decided influence upon prices. Therefore, as the price structure is so flexible, no schedule of prices is included in this publication. Colonial Mica Corporation price lists will be made available as published. It is suggested that the miner consult the nearest Colonial Mica Corporation office or field representative concerning the current price schedule. A list of this corporation's offices follows:

Main office:	Colonial Mica Corporation, Dale L. Pitt, President, 92 Liberty St., New York 6, N. Y.
Branch offices:	New Hampshire Orrin P. Peterson, Manager, 22 Ash Street, Newport, N. H.
	North Carolina W. J. Alexander, Manager, 542 McDowell St., Asheville, N. C.
	South Dakota Hubert DeBeck, Manager, Custer, S. Dak.
	New Mexico E. J. Wemlinger, Manager, Santa Fe, N. Mex.

When it is necessary for Colonial Mica Corporation to buy nonstrategic qualities, it is limited in the prices it can pay by current prices established by the Office of Price Administration. There may be a separate ceiling for each mine or each different quality of nonstrategic mica.

Buyer and seller are equally guilty if transactions take place at above legal ceilings. Both must avoid violation of this important regulation.

Glossary of Terms

Block mica	Random thickness ⅛ in. to less than 1/100 in. (125 to 10 mils), which contains a usable area of 1½ by 2 in. minimum. The general term "block mica" is the correct designation for the more commonly used domestic form "sheet mica" in Southeastern states and "plate mica" in the New England and Western states.
Circle	Roughly, better than 2 in. in diameter, usable area.
Classification	Process of qualifying or segregating block mica as to quality. The domestic and Indian qualities are shown on page 7.
Heavy stained	May contain minor cracks, clay and vegetable stains, but should be relatively free of mineral inclusions.
Red stained	Similar to the above, with red inclusions.
Clay stained	Inclusions of clay or mud within the laminae.
Light dotted stained	May contain mineral inclusions in very small dots in segregated areas.
Black spotted stained	May contain mineral inclusions in splotches; a greater area may be affected than in light dotted, and size of the inclusions may be greater.
Black stained	Contains black streaks, stains, and spots; virtually entire area of sheet is affected.

(See also A. S. T. M Standards of quality given in section on "Classifying.")

Color	Clear muscovite in thin films is almost colorless. Films about 50 mils are best for judging color. "Ruby" is ruby red. Other colors need no explanation, though "smoky" commonly indicates presence of numerous microscopic air bubbles or mineral inclusions.
Dielectric	An insulating substance capable of supporting electrical stress.
Electrical mica	Heavy stained, light dotted, black stained, heavy black-stained qualities.
Flat	Having a plane surface containing no ridges, waves or ripples.
Grading	Process of sizing or segregating mica of roughly the same size into groups.

(*Continued on page 77*)

Blast Hole Diamond Drilling

Drilling Long Blast Holes with Diamond Drills Has Proven Highly Adaptable to Certain Types of Ore Bodies. Further Technical Advances are Predicted

By OLOF V. LINDQVIST
Research Engineer
J. K. Smit & Sons, Inc.

BLAST hole drilling with diamond bits has been introduced recently with marked success in a number of mines in the United States and Canada; also in the copper mines of Northern Rhodesia from where definite details, unfortunately, are not available.

The introduction of small drilling bortz, mechanical setting of bits and light, small, fast-rotating drilling machines, three factors which more or less evolved from each other, have made this development possible. The major share of the credit, however, should be given to the pioneering mining companies, who have devoted time, material and resources to developing a new diamond drilling technique, adapted to blast hole drilling.

In this paper, a short description is given of different applications of blast hole diamond drilling, followed by a discussion of drilling equipment and drilling technique.

Present Applications

The principal advantage of diamond drilling over rock drilling is that it permits the drilling of deep holes. In rock drilling the gauge of the bit wears, and when the bit is changed, a bit of smaller diameter necessarily follows. The size of the hole, gradually decreases and there is an economical limit as to the depth to which a hole can be drilled, depending on the rock and the size of the hole at the start. In underground work 15 to 20 ft. is considered a fairly deep hole for a rock drill and only with difficulty can deeper holes be drilled. With diamond drilling, on the contrary, the hole size is constant and it is unnecessary to reduce the bit size for drilling to depths practical for blast hole drilling.

Blast hole diamond drilling to date has found its widest application where the ores occur in wide, lenticular bodies, dipping vertically or steeply, thus permitting the mining of large stopes.

Noranda Mines, Quebec

The orebodies being of large size, standing vertically, and the ore, as well as the surrounding rock, being exceptionally strong, the geological conditions are extremely favorable for sublevel drift stoping, which, therefore, is used throughout the mine, both in sulphide and rhyolite flux ore.

In the beginning the rock drilling in the stope was done with sectional drill steel. Stopes with dimensions of 60 ft. width, 175 ft. height and up to 300 ft. in length could be drilled from five sublevels. Fig. 1 illustrates a typical stope of this type.

In 1939, blast hole diamond drilling was used mainly in rhyolite flux ore and it was not yet established that it would be economical in sulphide orebodies. However, the last few years have given a definitely favorable answer in this respect, the diamond drilling costs in the sulphide ore being as low as 30 cents per foot against 26 cents for rock drilling. This difference is more than compensated for by the reduction in the amount of preparatory work, etc.

The footage drilled with rock drill in the sulphide orebody formerly averaged 65 ft. per machine shift. With diamond drilling, the average footage in the same orebody is now 70 ft. and with some fast rotating machines, especially adaptable to this work, an average of 100 ft. has been made over a length of time in the harder sulphides and as much as 150 ft. in softer sulphides.

Aldermac Mine, Quebec

Originally blast hole diamond drilling was adapted to mine a floor pillar between the fourth and fifth levels. The pillar which extended 20 ft. above and 30 ft. below the fourth level floor was 160 ft. long by 110 ft. wide. It was unsafe to mine this pillar by benching as it was cut by several systems of joints and slips, and the only safe way to break it was by drilling long diamond drill holes from safe

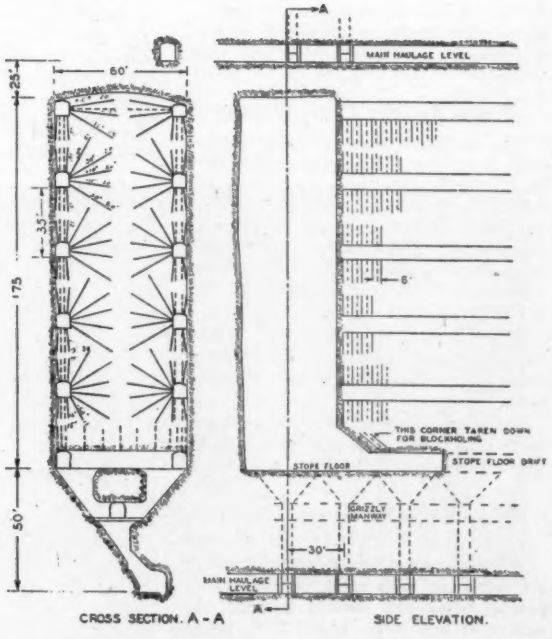


Fig. 1. Standard sulphide stope at Noranda with layout for sectional steel drilling

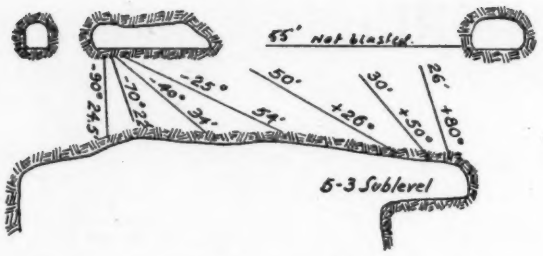


Fig. 2. Diamond drill blasting of fourth floor pillar at Aldermac

locations in or near the walls. Fig. 2 illustrates the method used. A slot was first slashed out across the width of the pillar from the footwall to the hanging wall giving a free space of 50 by 110 ft. The drilling was done in vertical rings from the footwall and the hanging wall, and the existence of the slot and open stopes below and above resulted in a very good breakage with a powder consumption of only 0.09 lb. per ton.

The use of blast hole diamond drilling was considered so successful that this new type of drilling was introduced in the regular stoping program. The Aldermac system can be described as "sublevel bench stoping," drilling rows of parallel vertical or nearly vertical holes from one floor elevation down to the next lower one. Fig. 3.

When the ore is solid enough to allow the slicing of a bench across the width of the orebody to give sufficient working space for the drilling machines, the Aldermac system has the advantage over ring drilling that the holes are spaced evenly apart over their entire length, resulting in better distribution of the explosive in the rock. It has a further advantage in the extensive use of downholes. On the other hand, the drilling machines have to be moved for each hole, whereas in ring drilling the whole ring of holes may be drilled from the same setup.

Waite Amulet Mine, Quebec

The sublevel drift stoping applied here is quite similar to the system used in Noranda, but the stopes here run lengthwise of the orebody. A slot is first opened across the eastern face of the orebody and drilling then carried on in vertical slices, 6 ft. deep, drilling radially in vertical rings from the drifts.

The shooting is either done simultaneously over the whole face, or lower sublevels are blasted ahead of upper ones.

An average of 80 ft. per machine shift is drilled, with cost of the drilling approximately 30 cents per foot.

East Malartic Mine, Norrie, Quebec

From slots cut across the bottom of the stope at both ends, parallel horizontal holes are drilled toward the center of the stope, about 5 ft. being allowed between the ends of the meeting holes. The holes are placed 8 to 13 ft. apart, depending upon the width of the stope, and the vertical burden on each horizontal row of holes is 6 to 8 ft.

An average of 35.4 ft. per machine shift was drilled with 4.93 tons of broken ore per foot using 0.15 lb. of powder per ton. The average cost per foot drilled was 60 cents, the holes being 1 7/16 in. diameter.

Flin Flon Mine, Manitoba

The large size of the almost vertical orebody made large scale stoping the most economical mining method, even before the introduction of diamond drilling. Blast hole diamond drilling, when introduced was immediately successful.

The Aldermac system of drilling was applied when diamond drilling was first employed but was finally superseded by the Noranda method. The drill holes are placed so that the maximum spacing at the bottom will be 9 ft. and the burden of each row of holes 6 ft. Speeds, diamond wear and maintenance on the machines are less favorable in up-holes, which, therefore, are avoided.

Howe Sound Company, Chelan Division, Washington

Howe Sound Company has tried six different systems of spacing holes, according to the Manager of the Chelan Division, Mr. John T. Curzon. First, holes were drilled radially in vertical planes across the stope from a drift in the footwall. The holes ending up against the hanging wall bootlegged and the system was abandoned.

A system of more or less horizontal and parallel holes from crosscuts in the middle of the stope in both directions toward the ends of the stope was

Method	No. of Holes	Ft. of Holes	Tons of Ore	Tons Per Ft.	Powder Lbs.-Ft.	Powder Lbs.-Ton
Vertical Ring	41	1,520	2,200	1.45	0.56	0.41
Horiz. Parallel Holes...	...	13,865	24,470	1.77	0.67	0.38
Aldermac	124	4,903	13,640	2.78	0.68	0.24
Noranda	153	5,842	22,538	3.86	0.68	0.18
Horiz. Rings	64	4,525	12,210	2.70	0.45	0.17

DATA FROM BLAST HOLE DIAMOND DRILLING IN MINES

Mine	Method	Hole Size	Burden Ft.	Feet per Shift	Tons per Foot	Cost per ft. Bits	Cost per ft. Total	Pow. Lb. Ton	Drill Cost per Ton
Noranda	Sublevel Drift...	1 3/16	6	70	3.4	..	.30	..	.09
Aldermac	Sublevel Bench..	1 7/16	6	44	4.4	.26	.51	.20	.12
Copper Mount.	Pillar Mining....	2 7/8	..	14	18.0	..	..	.16	.15
Waite Amulet	Sublevel Ring ...	1 3/16	6	80	4.0	.10	.30	.15	.08
Flin Flon	Sublevel Ring ...	1 7/16	6	86	4.5	.06	.34	.14	.06
East Malartic	Shrinkage	1 7/16	6–8	35	4.9	..	.60	.15	.12
Sladen Malartic	Shrinkage	1 3/16	4	53	1.5–2.5	..	..	.40	..

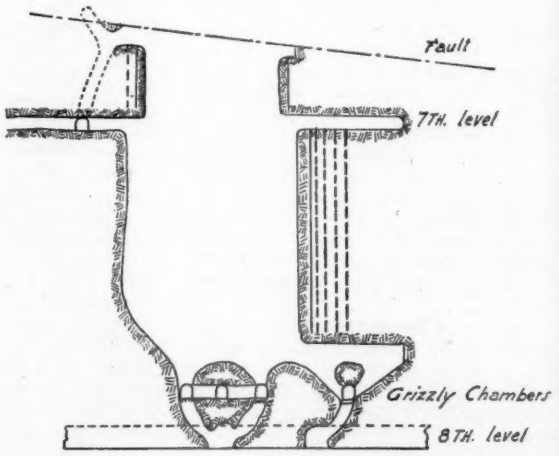


Fig. 3. Sublevel bench drilling at Aldermac

next tried. Considerable bootlegging was also noticed here on both ends of the stope where the long holes were "deadended."

The Aldermac system was successfully tried on the 1,250-ft. level.

The Noranda system was tried on the same level, with still better results.

The system of drilling horizontal rings of holes from a raise in the hanging wall was tried. To avoid deadending holes, a slot was cut out at the western end of the orebody and horizontal holes were drilled from there in the same plane as those from the raise.

The latest drilling method is a series of flat holes drilled from the raises in each end of the hanging and footwalls. A raise is driven in the center of the footwall, although no drilling is done from it.

An idea of the value of the different methods is obtained from the figures shown in the accompanying tables.

Drilling Machines

Until recently the most commonly used type of diamond drill was the air-driven machine with reciprocating motor and separate swivelhead, with drill spindle driven through bevel gears from motor shaft and spindle fed mechanically by gears. The rate of feed can be varied from around 100 to 700 or 800 revolutions per inch. Spindle speed of these drills varies between 1,000 and 2,500 r.p.m.

A recently developed vane type motor seems to be well adopted to blast hole drilling in hard and soft ground. It is compact, weighs 160 lbs., mounts on standard rock drill saddle and handles like a drifter. While standard spindle speed is 1,500 r.p.m. provision has been made for speeds of 2,000 and 2,500 r.p.m.

Such factors as wear on machines and rods and vibration of rods and bits are influenced by rotating speed. A properly designed machine, well balanced and rigidly mounted, with straight drill rods, allows speeds as high as 4,000 r.p.m. under favorable rock conditions without excessive abuse to machine or rods, whereas a poorly mounted machine with bent and unbalanced rods, etc., may show serious vibration even at 1,000 r.p.m.

At the high speeds used in blast hole drilling it is generally advisable to keep the diameter of the drill rod as close to the diameter of the hole as circulating water requirements permit.

Mechanical (screw) feed is generally used in blast hole drilling. It is simple, low in upkeep and effective in the hands of the average operator.

Drill Bits—The drill bit is one of the chief factors in determining total drilling cost. The bit cost includes diamond cost and setting charges, and averages from 30 percent to 50 percent of the total and the bit determines largely the footage per shift, thus directly affecting the other major factor, labor cost per foot.

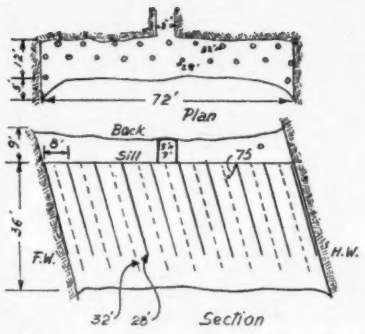


Fig. 4. Average stope bench as in 50 stope at Flin Flon

However, the choice of bits can be narrowed down to a considerable degree by careful application of previous drilling experience to the existing problems.

Size of Bit—In Canada, the most widely used hole size is 1 3/16 in. At Copper Mountain, 2 7/8-in. holes are drilled. It has resulted in the extremely high breakage of 18 tons per foot drilled, at a total cost of only 15.7 cents per ton. One observer states that better fragmentation was obtained with 1 7/16-in. holes than with 1 3/16-in. and that no extra labor or bit cost resulted. The footage drilled per machine shift was reduced from 70 to 60 ft. but the tonnage per machine shift was increased from 336 to 366 tons.

Shape of Bit—Much research has been made with different shapes of diamond drill bits. In the round faced bit, the small diamonds are more securely held on the edges, and as the bit contains more stones it cuts faster in hard formations. The flat faced bit is easier to set, contains less diamonds and can, therefore, be made cheaper. It has also been claimed that the flat faced bit cuts a straighter hole, although a great number of drillers question there being any material difference between the two types in this respect. Most of the coring bits now used in Canada have a flat face with slightly rounded corners, the radius of the corners being approximately 1/16 in.

Of the various non-coring bits tried, two have gradually proven themselves more successful. The concave type, is the most commonly used. It is the fastest and cheapest bit to use in relatively soft rock. Increased vibration and deviation of the drill hole tends to limit its use in the harder rocks.

The pilot bit was an outgrowth of the semi-spherical—bullnose—bit with a small coring hole in the center. Since the central part of the bullnose bit wore out faster than the peripheral part, the pilot bit was made with a replaceable central pilot. In the last two or three years, the design has been changed again, and the bit is now made in one piece but with an integral pilot. In general, the pilot bit is used in hard ground where the concave bit cannot be used.

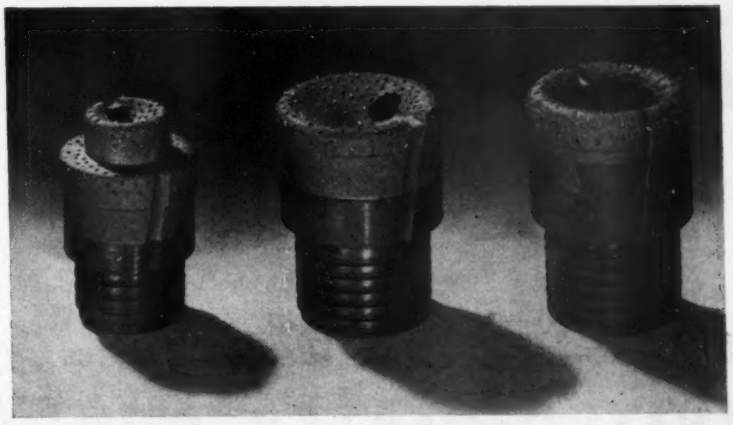
Distribution of Diamonds in Bit—Drilling tests show a marked decrease in diamond wear with increasing rotating speed, up to about 700 r.p.m. beyond which it is fairly constant.

Generally, in mechanically set bits, the diamonds are distributed evenly per unit of area of face.

Two independent tests have shown that a EX bit set with 100 stones gave 58 percent and 54 percent, respectively, higher cutting speed than the same bit set with 40 diamonds, and these results have been fully confirmed in practice throughout the last few years. However, a certain critical pressure must be maintained.

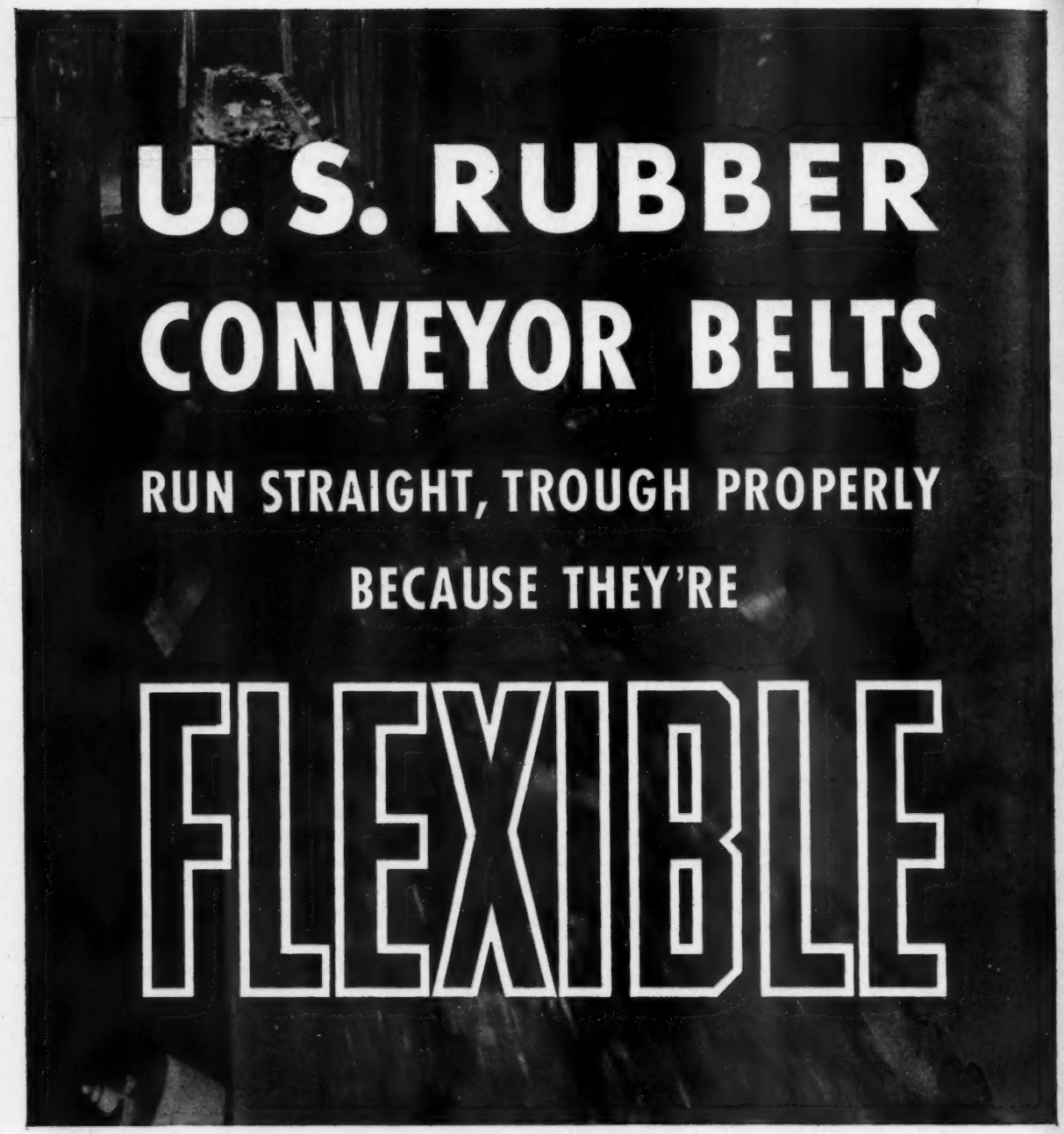
Type, Size and Quality of Diamonds—The size and quality of diamonds is largely dependent on the price and the available supply. We now use diamonds 16 to 60 per carat, and even 100 to 125 per carat. Cheaper bortz of mixed West African production has

(*Continued on page* 77)



Pilot bit Concave bit Coring bit

Diamond drilling bits



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Coal Mining In Two Wars

By GEORGE E. STRINGFELLOW
Thomas A. Edison, Inc.

AMONG the various problems which the coal mining industry, in common with other industries, is faced with, I want to deal briefly with these three:

(1) Shortage of labor.
(2) Competition from other industries.
(3) Bureaucratic interference.

Since there has been a lapse of approximately a quarter of a century between World War I and World War II, a brief comparison of the position of the industry in these two periods may help to focus attention on some long-term trends which have a bearing on these problems.

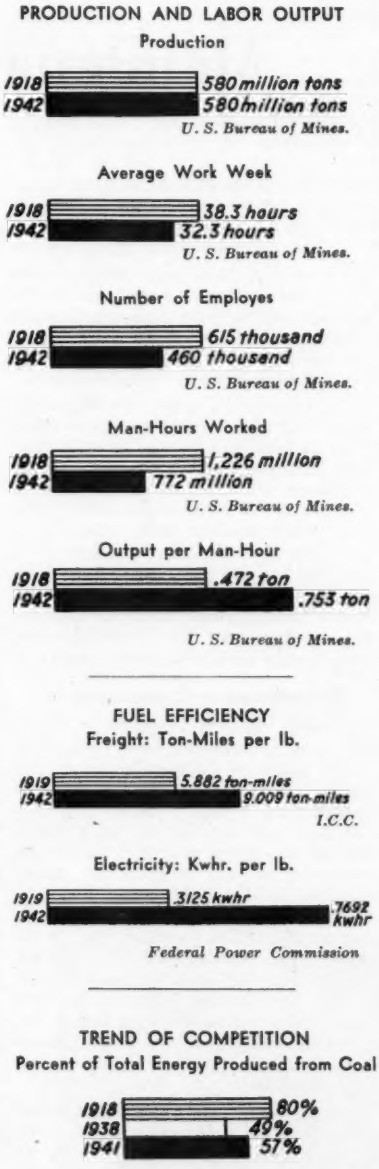
With this in mind, I have prepared some charts from data published by the Bureau of Mines, Department of Labor and other sources believed to be reliable, which give a comparison between certain years of the two war periods.

The figures on production and labor output show that 1942 bituminous tonnage equaled that of 1918 but was accomplished with a 15.6 percent shorter work week, a 25.2 percent reduction in number of workers, and 37 percent fewer man-hours; and that this was made possible because, by mechanization and other efficiency measures, average output per man-hour was increased 59.5 percent.

Actually the industry accomplished more than even these figures indicate because the 1942 output represented a 50 percent increase since 1939, while 1943 production is reported at 587,000,000 tons, a new high record, and employment, according to the Department of Labor, showed a further drop of 10 percent below 1942.

This is an outstanding contribution to the war effort. How outstanding it is can be illustrated by the fact that at the man-hour productivity of 1918 and the work week of 1942, the industry would have needed 271,000 more miners to produce the 1942 output and would need 366,000 more to produce the 620,000,000 tons which the Solid Fuels Administrator has announced as the goal for 1944.

Another way to illustrate what would have happened to the war effort and to your industry, if you had not mechanized and improved your operating efficiency since World War I, is to ask where 271,000 additional miners could possibly have been obtained in 1942 or where 366,000 additional could be obtained this year.



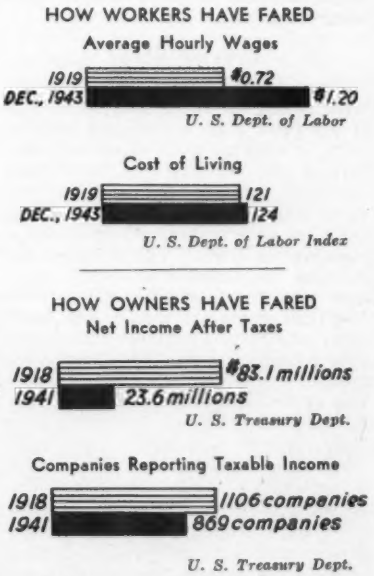
Mindful of your markets, you have improved the quality of your product by mechanical cleaning; and efficiency in coal utilization has increased substantially both in railroad freight, where, according to the Interstate Commerce Commission, the ton-miles per pound of coal increased 57 percent, and in electric power generation, where, according to the Federal Power Commission, the kw. hr. per pound of coal increased 142 percent.

In 1918, the coal industry enjoyed a commanding position in the energy market, 80 percent of the total having been supplied by coal, and 20 percent by oil, natural gas and water power. By 1938, when we first began to prepare for war, coal was supplying only 49 percent of the market. But since then, the competitive position of coal in this market has improved rapidly as shown by the fact that in 1941, the latest year for which figures are available, the proportion of the market supplied by coal had risen to 57 percent.

According to the Department of Labor, average hourly earnings of the miners increased from 72 cents in 1919 to $1.20 in December, 1943, an increase of 66⅔ percent, while the same department's cost-of-living index rose only from 121 to 124 or barely 3 percent.

On the other hand, according to the U. S. Treasury Department, there was 21 percent fewer coal companies reporting taxable income in 1941 than in 1918, and the total net income after taxes decreased from $83.1 millions in 1918 to $23.6 millions in 1941, a decline of 72 percent.

It is clear that the coal mining industry has made a great financial contribution toward the welfare of the nation and that, while labor's position has improved 66⅔ percent with no appreciable change in the cost of living, those who have invested their savings have suffered a substantial reduction in their return.



(Continued on page 77)

Maintenance Organization and Maintenance Practices

Reports by the Committee on Mechanical Loading

Report on Mine C

By C. R. NAILLER

THIS report describes the maintenance practices of a company operating three large mechanized underground mines and two strip mines. The central part of the maintenance organization is the Central Machine Shop located immediately adjacent to the largest strip mine and was so placed because of the tremendous problem involved in transporting strip mine equipment as compared with the transportation of small underground machine units.

Central Shop

This shop is housed in a building with 10,000 sq. ft. of floor space and is equipped with a complete complement of machine tools, blacksmith and forging shop, welding shop, warehouse, assembly floor and offices. Immediately adjacent is a small building equipped with soaking pits and steam cleaning facilities. The management is under the direction of a chief engineer who directs the activities of an electrical engineer, mechanical engineer, construction engineer and central shop superintendent. The shop superintendent is responsible for the operation of the central shop, and the engineering staff act as consultants in their respective fields, to the shop superintendent and the maintenance departments of the operating mines.

The maintenance program in effect at the three underground operations is very similar to the particular mine whose maintenance and organization is described herewith.

Underground Equipment

The mine is 100 percent mechanized, using track-mounted equipment exclusively, working three shifts, six days per week with nine coal loading units regularly employed each shift. On Sunday one or two skeleton loading crews are used to clean falls. Approximately 6,500 tons of material is handled each day.

The mine has a slope with the working sections located three to four miles from the pitmouth and is equipped with 13 loading machines, 11 cutting machines, 22 locomotives, 15 electric coal drills, 190 large eight-wheel mine cars, three underground sub-stations (one 300 KW. rectifier, one 400 KW. rectifier, one 400 KW. motor generator set), 12 sectional automatic reclosing circuit breakers and other miscellaneous equipment. The underground equipment is almost all seven years old.

Maintenance Organization

A large modern washery is maintained by a maintenance organization which operates independently of the inside maintenance. The outside maintenance group is under the outside foreman because we have found that he can more ably coordinate the activities of the preparation plant operation and maintenance. The outside maintenance foreman is also in charge of repairs to mine cars in an outside car repair shop. The tipple repair is carried on in a shop attached to the preparation plant. A chief outside electrician working under the direction of the outside maintenance foreman is responsible for plant electrical maintenance.

The inside maintenance organization is under the direction of the master mechanic, who reports directly to the mine superintendent. The master mechanic is assisted by six foremen who are salaried men and who direct the various phases of the work. A shop foreman for each of the three shift repair crews rotates on a three-shift basis with their respective crews. The master mechanic works on the day shift, as do two of his assistants, namely chief inside electrician, and the back shop foreman. A new maintenance supervisor has been added recently, whom we call the machinery inspector foreman. This supervisor is in charge of the lubrication crew, checks on, and to some extent, supervises the work of mechanics while at the face and instructs machine operators as to proper operation of equipment.

Underground Shops

The maintenance facilities consist of three major parts—first, the central underground machine shop, is located along the main haulage road about two miles inside. It is about 180 ft. long, 30 ft. wide and 16 ft. high, gunited and has four auxiliary gunited rooms which house an office, machine tool room, warehouse and an electrical repair shop. Over the entire length of the shop is a traveling crane. The machine tool room contains lathes, drill presses, grinder, shaper, hydraulic press and hydraulic testing equipment. The warehouse contains a complete stock of minimum repair parts for a normal 24-hour operation. The electrical shop is equipped with a cable vulcanizing machine and electrical testing equipment. Two concrete repair pits are located under the machine tracks. Welding machine and air compressor, along with other tools permit the rebuilding of a mining machine and the making of some of the simple parts. The back shop foreman, and his group work exclusively in this shop. They make complete, or partial rebuilds on all types of equipment.

The advanced repair shop consists of a gunited entry about 150 ft. long and 18 ft. wide, having additional storage space for machinery available in adjacent stub entries. This shop is located at the junction of the two main working areas of the mine and is not more than a mile distant from the farthest possible working section. It is equipped with a lathe, small shaper, hydraulic press, drill press, welding machine, chain, blocks, metal saw and repair pit. The shift maintenance

NOTE: Reports on Mines A and B were published in May MINING CONGRESS JOURNAL.

foreman and his crew work in this shop which was designed to keep the spare equipment in running order with a minimum of major repair work on the working section.

Located in each working area of the mine are two mine mechanic maintenance stations. These maintenance stations are moved frequently enough to insure its being within easy walking distance of any working section. The maintenance station consists of a small fire-proof room about 10 ft. wide and 20 ft. long, in which is located storage bins, containing a minimum of repair parts, a small bench type grinder; facilities for the storage of mechanics' tools, and a light weight portable grinder. Immediately outside of the maintenance station is a rack in which spare drill is kept. The mine mechanic on each shift who is assigned to such a station works from this shop and makes any simple running repairs necessary. The mine mechanic also keeps a record of the location of the spare equipment on his side of the mine and aids in the transfer of this spare machinery to any working section where it is needed.

Maintenance Practices

The central underground machine shop, as previously stated, is the headquarters for the master mechanic, chief machinist, chief electrician, and back shop foreman. These men carry on the following functions and maintenance practices.

The chief electrician is responsible for the vulcanizing of mining machine cables, whenever the cables have a maximum of six splices. He rebuilds motors, switch gear and control equipment. No attempt is made to do armature repair work other than turning and under-cutting commutators, and painting of armatures. Sub-station maintenance also comes under the chief electrician by making detailed inspection each Sunday of all of the conversion equipment. This inspection is made in accordance with a standard method of inspection designed to thoroughly check the machine. The wiring throughout the mine, such as trolley wire, and feeder circuits is under the supervision of the general mine foreman. The wiring is installed in accordance with wiring standards set up by the superintendent, mine foreman and master mechanic which will insure adequate face voltage. The chief electrician occasionally checks face voltages with recording instruments, and is directly in charge of the installation of all sub-station equipment.

Warehousing and record keeping is performed by an assistant clerk, who is responsible for maintaining an adequate stock of parts, and a complete history of work performed on equipment. From these records, the master mechanic is able to determine which machine should be assigned to the back shop foreman for rebuilding and also to determine what particular units of any machine are in need of renewal. A system of complete overhauling is not followed, in that we have found from experience that certain units, or parts of a loading, or cutting machine will have a much shorter life than other units and, therefore, need replacement earlier. All of the mechanics are staggered, or replaced throughout the week so that they will be available for Sunday work on a six-work-day per week basis.

A few specialist workers are also stationed in the central underground shop. One man is assigned to the maintenance and rebuilding of coal drills. Capable welder performs all of the welding jobs, unless an emergency occurs, in order to insure a high standard of workmanship. Another mechanic specializes in the rebuilding of hydraulic pumps and valves.

Lubrication of the mining equipment is under the direction of the machinery inspector foreman. This lubrication crew is equipped with a complete pressure operated car which is hauled around the mine to the various pieces of equipment by locomotive. Lubricants have been standardized so that only one lubricant oil and two types of grease are used. The lubrication crew, in addition to greasing each piece of equipment twice a week, replaces any missing grease fittings or hoses and blows the dust out of the motor and controller. The lubrication crew keeps a record of when the machines are greased, so that none will be overlooked.

Reports of work needed on any piece of equipment come to the central shop and the master mechanic's attention, through several different channels. In the case of an impending minor repair on a piece of equipment, working on a section, the section foreman, or machine operator calls the mine mechanic. A record of this conversation is made by the dispatcher, who controls the entire mine telephone system and it is relayed by him to the advanced repair shop. The mine mechanic also makes a written record of all reports which come in to him and states whether or not they were corrected, in a special book located at his maintenance station. The machinery inspector foreman checks these books regularly. The section foreman also makes a written report on anything that is wrong with his machinery, which goes through the hands of the mine mechanic to the advanced repair shop and ultimately to the master mechanic at the central underground shop. Inspection reports are made by the mine mechanic and the machinery inspector foreman. Machinery inspector foreman decides whether or not these repairs should be made by the mine mechanic or refers them to the advanced repair shop.

The advanced repair shop has the primary job of keeping spare equipment in running order so that the main underground repair shop can concentrate on complete rebuilds, or partial rebuild work. This shop also functions on the theory of performing minimum repairs on the working section by transferring spare equipment to the working face. The three shop foremen and their respective crews, working in this advanced repair shop, have been assigned a particular type of equipment on which they specialize. Each crew must, of course, take care of repairs to any type of equipment which might break down on their shift. One crew is assigned locomotives and is responsible for keeping the necessary unit parts, such as armature assemblies, complete controller, etc., made up and ready for instant use, as well as scheduling locomotives to come in to the shop for inspection and service. This crew also recommends to the master mechanic the order in which locomotives should be rebuilt. The other two crews function in a like manner, specializing in loading machines and cutting machines.

Underground machine shop

Report on Mine D
By J. A. YOUNKINS

THIS report covers maintenance practices in a shaft mine producing 3,700 tons per day, hoisting two shifts, with nine mechanical loading units working three shifts and one unit working two shifts. In addition to the 10 coal-loading machines there is one rock-loading machine that is engaged in cleaning up and grading in old sections prior to mining. The mine has been developed to its boundaries and is now entirely retreating with four major working sections.

In addition to the 11 loading machines, other major equipment items are: 24 locomotives, 18 cutting machines, 17 electric drills, 51 pumps, 2 rockdusting machines, 1 inside 300 KW. M G set, 3 outside KW. M G sets, 3 outside 200 KW. M G sets and 1 outside 150 KW. M G set.

Maintenance Organization

Maintenance of mechanical and electrical equipment underground in the mine is carried on under the supervision of the master mechanic. Two crews consisting of a machine boss and four repairmen, and one crew of machine boss and five repairmen, each working eight hours per day seven days per week, provide round-the-clock maintenance at the mine.

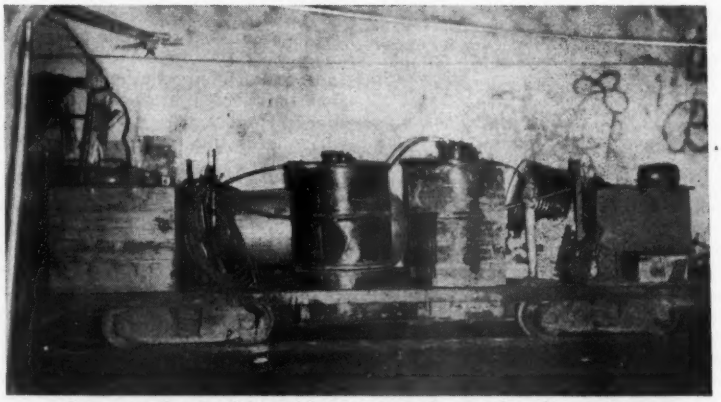
The three machine bosses are paid on a day rate basis and are placed in charge of their repairmen by the master mechanic. Each machine boss is responsible for the scheduling of the work to be done in the shop on his shift as well as the dispatching of repairmen to points inside the mine in the event of on-shift breakdowns to mechanical equipment.

Crews change shifts every two weeks, going from day shift to afternoon and then to midnight shift. In this manner, each crew comes under the surveillance of the master mechanic for two weeks out of every six-week period.

Shop and Section Repairs

Normally, the repair crew coming on shift begin their day's work on drills, mining machines, or locomotives being repaired in the shop at the shaft bottom. The crew remains on this work until such time as they are dispatched individually or in pairs to various working sections of the mine to repair loading machines or minor breakdowns to other equipment in the sections. As section 4, which embodies six of the 10 working mechanical loading units, is some distance from the main bottom and machine shop, repairmen, after completing their work on the one or more equipment failures requiring their presence in the section, remain in that section and visit other equipment for inspection purposes. Weekly inspection for permissibility of mining machines in this section is taken care of at these times.

Whenever possible to do so, loading machines are repaired in the working section by repairmen dispatched to that job from the shop as breakdowns occur. However, in the event of major breakdowns requiring shop facilities for repair, the loading machines are brought to the shop and return to the section as soon as repairs have been made. Special carriers are used for transporting caterpillar-mounted machines, while truck-mounted machines are pulled with a motor. As no spare loading equipment is on hand, removal of any loading machine to the shop necessitates virtual suspension of loading in that section until the return of the machine. Routine minor repairs such as the repairing of broken caterpillars, drive chains, conveyor chains, cable failures, etc., are done by the machine operator at the face.



Grease car for distributing lubricants to underground working sections

Each loading machine is scheduled to come to the shop every fifth Sunday for inspection and major part replacement. This schedule is followed as closely as possible, but varies somewhat due to unforseen emergencies. No major overhauls are performed on any loading machine due to lack of spare equipment. However, spare major parts, such as loading heads, fan and midsection, loading booms, and chassis are on hand, and these parts are installed when needed, over week-ends whenever possible. Worn or broken major parts are sent to commercial repair shops for rebuilding.

Sufficient spare mining machines are on hand in the mine to permit all mining machine repairs to be made in the shop. However, broken machine ropes are replaced, and trailing cables are spliced at the face by the operator. No regular schedule for major overhauls on this equipment is observed. Each mining machine is inspected for permissibility each week between Wednesday and Sunday, and a report of the condition of the various machines furnished the superintendent.

Electric coal drills are repaired in the shop as spare equipment is on hand in the sections. Blown fuses are replaced, and trailing cables spliced, however, at the face by a person authorized to do so by the mine foreman.

All locomotives are brought to the shop for all repairs except blown fuses and blown-out trailing cables. Spare armatures, fields, and wheels for the various types of locomotives are kept in the shop. Bad trailing cables are replaced, and reclaimed by reforming with vulcanized splices. This vulcanizing is done by sub-station operators under the direction of the master mechanic. All locomotives are inspected weekly for mechanical and electrical defects each week and a report furnished the superintendent.

Pumps inside the mine are repaired at the pumphouse by repairmen. Worn water ends and impellers are sent to commercial repair shops for rebuilding. All pumps are periodically inspected for electrical defects. Minor repairs are made by pumpers whenever possible. Rock-dusting machines and air compressors are repaired as needed in the shop by repairmen.

The two car hauls at the shaft bottom are maintained by the repair crews, and are repaired as defects are detected. The electrical equipment on the rotary dump is inspected and maintained under the direction of the master mechanic, but the dump itself and relative mechanical equipment is maintained and repaired by the outside repair crew under the supervision of the outside foreman.

Minor repairs to the inside motor-generator set in Section 4 are made by the master mechanic. These repairs are limited to such items as changing brushes, checking and changing bearing oil and cleaning coal dust or rock dust out of the set.

Report on Mine E
Prepared by a Coal Company
and Submitted to
R. S. BIGELOW

THE maintenance of mechanical loading equipment breaks sharply into two groups, mine and central shop maintenance. Mine maintenance features inspection, lubrication, face repairs and shop repairs not requiring machining and partial overhauls. Each mine is equipped with a spare unit ready to operate in case a face unit fails.

General Procedure

The central shops serving all mines rehabilitate damaged or worn-out mechanical loading equipment. In so far as possible, we divide the parts of our equipment into assemblies, motors, controls, drives, clutches, hydraulic pumps and controls. These assemblies are grouped so that each is self contained and readily removed and replaced. Spare assemblies are provided and when any part of one of these assemblies fails in service a new assembly is available and quickly put in service. The damaged assembly is sent to the shops for inspection and necessary rebuilding to shop standards.

The general policy is to replace defective parts where economically possible with repair assemblies rather than have the mine maintenance crews make time consuming or improvised repairs. Recurring delays and further damage to equipment is avoided by this policy. Shop rebuilt assemblies permit more accurate fitting of parts, a higher standard of work, better access to supplies and a better production from specially trained men than from all-around mine mechanics.

Shops

Equipment severely damaged by accident or failure is brought to the central shop for straightening and rebuilding over factory standards. Parts failing frequently are strengthened or redesigned. The work performed in the central shop is too varied to describe. This work is distributed among three groups—machinists, electricians and a group of mechanics and welders specially trained in handling repairs of mining equipment.

The machinist and repair group are housed in a large machine shop well equipped with lathes, shaper, millers, plane, drill presses, boring mill, Do-all saw, metallizing, arc and gas welding equipment, hydraulic press, shears and power hammer with adequate floor space for repairs and assembly.

The electric shop is housed in a well-lighted building fitted with a traveler crane. An attached building houses the dipping and baking equipment. Armatures and coils are baked by an infra-red lamp assembly. Other equipment consists of a banding equipped turning lathe, shears, coil winder, 250-500 volt motor generator set, complete test meter equipment, stripping, winding and bearing assembly benches.

The entire set-up of this plant features thorough and careful rebuilding and repair of our equipment to a high standard with a maximum salvage of worn or broken parts. The shop buildings are well ventilated, lighted and have a central heating plant with directed distribution of heat. Ample sanitary conveniences and cooled drinking water fountains are provided.

Description of Typical Mine

A typical mine produces approximately 5,000 tons of material per day. All loading is done mechanically and at present there are 14 mechanical shifts, seven shifts in daytime and seven shifts at night. Four of these shifts are operated by small crews doing special development work, and as a rule load approximately 50 percent of the amount of coal for full sized crew. The night shift follows the day shift with one and one-half hours elapsed time between shifts. Underground there are 10 track-mounted loading machines, eight track-mounted cutting machines, seven track-mounted drills, 18 gathering locomotives, two haulage locomotives and also a number of pumps, rock dusters, air compressors, etc.

The underground maintenance department takes care of all underground equipment, making all repairs necessary to keep the equipment operating. All major assemblies such as motor boxes, clutches, hydraulic pumps and other units are on hand to replace in case of failure. The defective assembly is then sent to the central machine shop where it is repaired, reassembled and sent back to the mine.

Repair Shifts

The chief electrician at the mine is in charge of all repairmen and divides his time between the three repair shifts as he sees fit but usually is present on the day shift and at the beginning of the second shift.

The day shift, or first shift, consists of two electrical repairmen and one helper who spends most of his time vulcanizing cables. The two electrical repairmen work on equipment that is in the underground shop and take care of breakdowns that may occur during that shift. The repairmen report for work one hour before the day shift ends in order to be ready to go to any section to take care of any repair work necessary between the day and night loading shifts. Any emergency work to be taken care of between loading shifts is reported in to repair shop by phone by the section foreman. Routine reports as to condition of equipment are made by all section foremen and left at the repair shop at the end of each shift.

The second repair shift takes over at the end of the first repair shift. This shift consists of one head repairman and two repairmen along with the two repairmen who started to work an hour earlier. This head repairman's work is outlined by the chief electrician at the start of the shift. This crew takes care of the repair work that is being done at the repair shop and also are on hand for emergency repair work at any of the sections that may be necessary.

The third repair shift comes on at the end of the second shift. This crew consists of one lead repairman, one repairman and eight helpers. The helpers work in pairs and go to each section, all sections being idle on third shift, where they inspect and thoroughly grease all equipment. The lead repairman along with the repairmen take care of routine repair work and have the equipment ready for the day loading shifts.

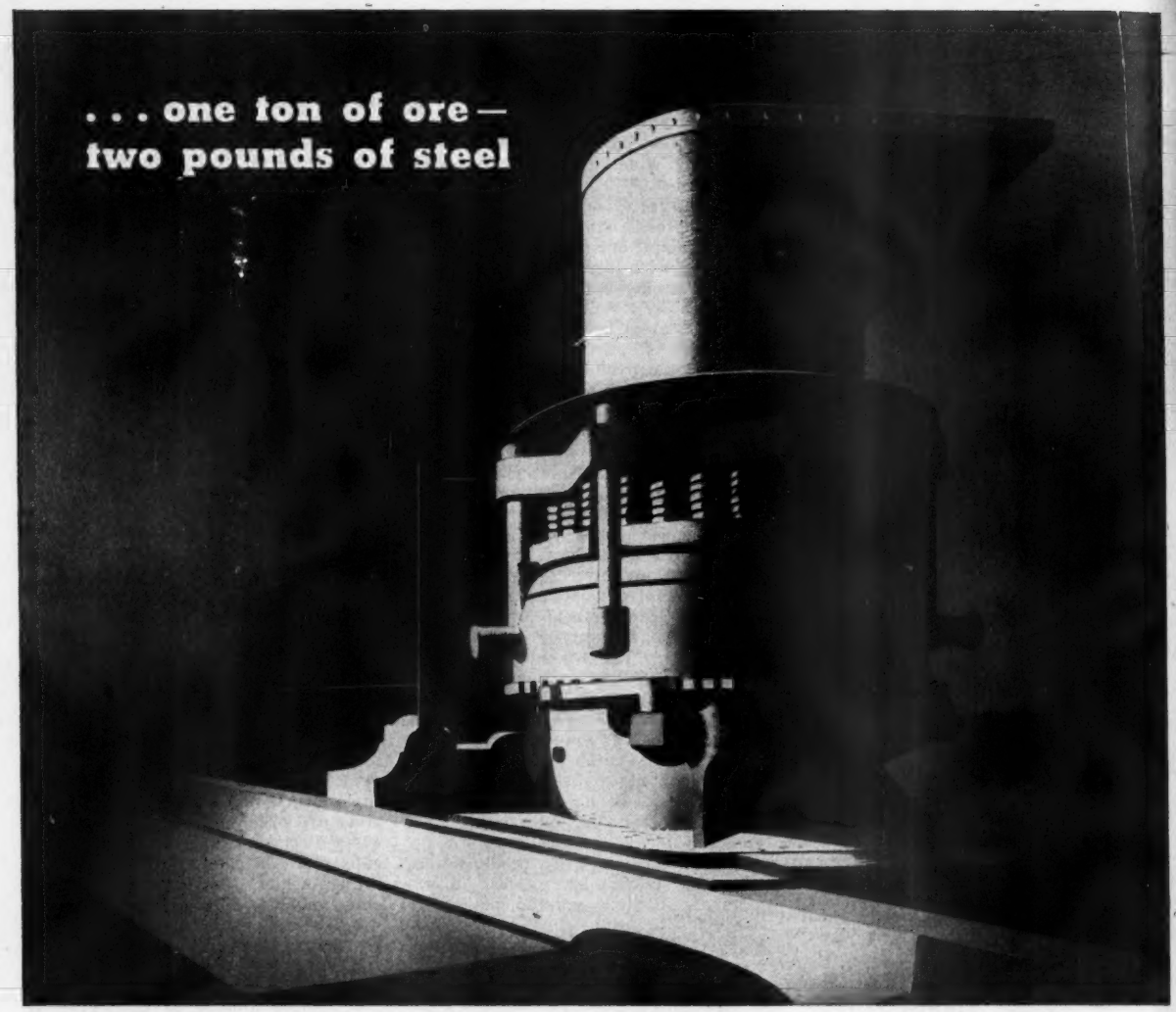
Maintenance Practices

Each loading machine is torn down once a year and worn parts replaced. Motor boxes are inspected at least once a month or oftener if found necessary. Cutting machines are inspected thoroughly once a month and motor boxes checked. Drills require very little other than the daily checking given to all equipment. Locomotives are brought to pit at least once every two weeks for checking of axle caps, etc. About every three years motor frames are sent to the central machine shop for reriveting.

All trailing cables are removed from service and splices vulcanized when more than five temporary splices are made in the cable.

A certain amount of lubrication is needed on most equipment during the working shift and oil and grease sufficient for this purpose are kept on the section in suitable cans. The loading machine helper, the cutting machine operator, the drillman and the motorman are responsible for the lubrication of their respective equipment during the operating shift.

Only one underground shop is maintained, however, each section carries a small amount of emergency supplies such as hydraulic hoses, spare links for drive chains, etc. The underground shop is equipped with a pit large enough to accommodate two pieces of equipment at one time with sufficient overhead hoists. The major items of equipment for repair work consists of, a welding machine, drill press, cutting torch, grinder, portable electric hand drills and other necessary tools. Spare parts including such assemblies as are replaced as units, sets of motor trucks for each type of locomotive and other smaller parts for replacement and repairs for all major equipment are kept in this underground shop.



During the war, the extra amount of steel worn away in mining operations represents a real percentage of total wartime steel requirements. Every pound saved helps the war effort.

After the war, the extra amount of steel worn away, because the proper steel is not used to meet specific requirements, will add proportionally to mining and milling costs. Every pound saved will help similarly to reduce your costs.

The figure, two pounds of steel worn away to every ton of ore mined and milled, will, of course, vary with different ores, mining and crushing methods—but *any* operation will save by specifying the proper steel, particularly in liners and balls.

Climax has been years developing the proper alloy steel for many wearing parts in its own mine and can therefore help you to lower your steel costs.

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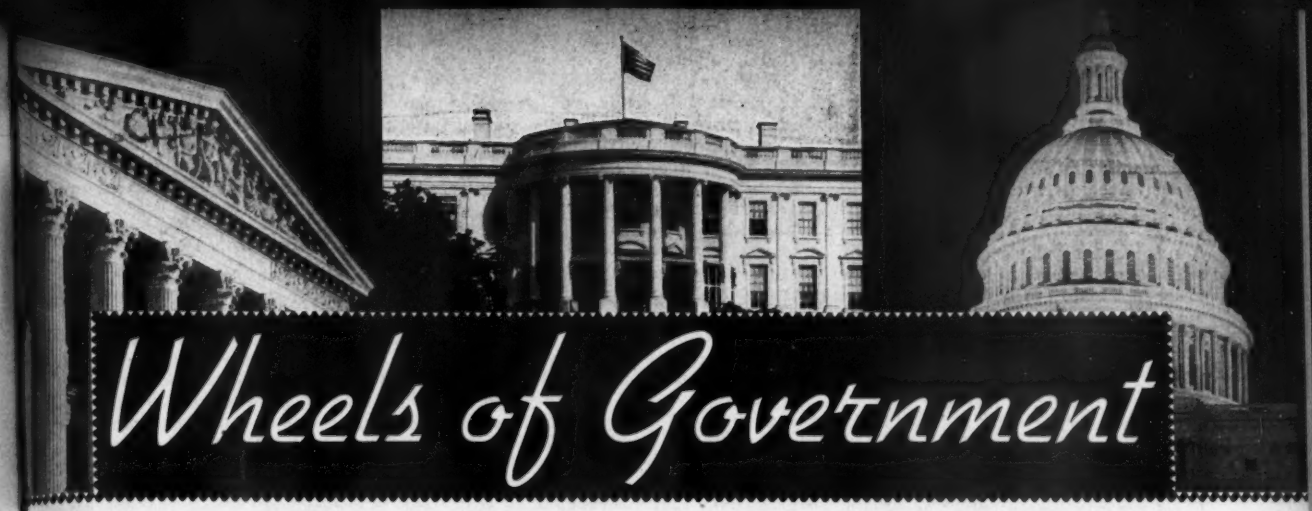

Wheels of Government

As Viewed by A. W. Dickinson of the American Mining Congress

DRIVING on toward the June 20 recess objective, members of Congress were encouraged in early May when the leaders emerging from a White House conference, held immediately after the President's return, reported that he had asked for no new legislation in addition to the current program. It appears that except for short recesses for the political conventions the Congress will remain in session, resorting to three-day recesses through the summer under an agreement which will bar consideration of controversial measures.

The appropriation bills are now moving rapidly. The bill extending the Lend-Lease authority has been approved by the President, as has also the individual income tax simplification measure. Extension of the Price Control Act may be delayed because of the pressure for amendments and it is quite possible that resort may be had to a joint resolution extending the act for 90 days, thus putting over further consideration until September.

Contract Termination

Handled by the House Judiciary Committee after passing the Senate on May 4, the George-Murray War Contract Termination Bill is not expected to be greatly changed in the form of final enactment. Tendered as a measure of compromise is a provision taken from the bill introduced by Representative Walter of Pennsylvania which would place the Comptroller General as a member of the Contract Settlement Advisory Board.

Surplus Disposal

The interdepartmental legislative committee which developed the George-Murray War Contract Termination Bill is now hard at the job of bringing forth a measure to cover the problems of surplus property disposal. New life has only recently been injected into the effort to secure legislative action on this extremely important subject and Surplus War Property Administrator William L. Clayton has stated before the House Military Affairs Committee that statutory authority is essential to the work which he has before him. He states that he considers his function to be that of a policy agency "sitting between" the War and Navy Departments, Maritime Commission, and other agencies owning surplus property on the one hand, and the RFC, the Treasury Procurement Division, etc., operating as disposal agencies on the other.

Of particular interest to metal and mineral producers is Clayton's expressed recognition of the stockpiling problem in his statement "except insofar as the armed services may wish to retain certain of the strategic and critical materials as a standby in the post-war period, for future protection and security, I do not think the materials should be frozen by act of Congress." Dovetailing into Clayton's expression was the testimony of Major General Lucius D. Clay, director of requirements, Army Service Forces, who stated both the War and Navy Departments are greatly interested in the obtaining of stocks of strategic and critical materials "which may be on hand in this country when the war ends so that these stockpiles may be held in the interest of national defense." He continued by saying that the War Department is greatly interested in stockpiling such items as antimony, asbestos, bauxite, beryllium, copper, rubber, and many other items for which we have had to depend either on foreign sources or on synthetic production; he continued that the War and Navy Departments would very much like to have the authority of the Congress to take over stockpiling thus creating a defensive reserve.

There has been no further movement on the part of the Scrugham stockpiling bill but the recognition of the need for stockpiling by these important officials is encouraging. It is also known that "Assistant President" Byrnes has given Clayton the job of composing the differences between the executive agencies on stockpiling legislation.

Exempt from Renegotiation

When the War Contract Renegotiation Statute was included in the Revenue Act of 1942, the natural resource industries made representations to the Senate Committee on Finance which resulted in the granting of an exemption from contract renegotiation for raw materials representing "the product of a mine, oil or gas well, or other mineral or natural deposit, or timber, which has not been processed, refined, or treated beyond the first form or state suitable for industrial use." In the regulations issued

Washington Highlights

CONGRESS: Hopes to begin recesses June 20.

CONTRACT TERMINATION: Bill soon to pass House.

SURPLUS DISPOSAL: Senate Military Affairs Committee expects early draft of a bill.

RENEGOTIATION: Expanded list of raw materials published.

GOLD-SILVER: July 1 conference set for world currency stabilization.

NATIONAL SERVICE: Senators propose "work-or-fight" law.

DEFERMENTS: Employers should act quickly.

COAL PACT: WLB approves wage agreement.

STOCKPILES: Government buys coal to keep mines running.

FOREMEN: NLRB rules they function as responsible representatives of management.

by the War Contract Price Adjustment Board in March, 1943, a list of exempt products was included and last month this list was expanded and is shown below with items which did not appear in the original list italicized:

Aggregates including such items as washed or screened sand, gravel or crushed stone. Alumina; *aluminum sulfate;* aluminum ingots and pigs. *Asphalt,* natural. Antimony ore, crude; antimony ore, concentrated; antimony metal; antimony oxide; *antimony sulfide. Arsenic, crude;* arsenic powder, arsenious oxide (white arsenic). *Asbestos rock;* asbestos fibre. Bauxite, crude, calcined or dried bauxite; *bauxite abrasive grains. Beryl ore and concentrates; beryllium oxide; beryllium metal; beryllium master alloys.* Bismuth metal. *Borax. Cadmium flue dust; cadmium oxide; cadmium bars and slabs.* China clay; kaolin; fire clay; brick and tile made from clays other than kaolin, china and fire clay. Chromium ore and ferrochrome; chromite not processed beyond the form or state suitable for use as a refractory; bichromates. Coal, prepared; run-of-mine coal. *Cobalt oxide; cobalt anodes, shot and rondelles. Columbium ore and concentrates; columbium oxide; ferrocolumbium.* Copper ore, crude; copper ore, concentrated; *copper matte; blister copper;* copper billets, cathodes, cakes, ingots, ingot bars, powder, slabs and wirebars. *Corundum ore and concentrates; corundum grain. Cryolite ore and concentrates. Diaspore; diaspore brick. Diatomaceous silica, lump, block, brick and powder. Feldspar, crude and ground. Ferrosilicon.* Fluorspar ore; fluorspar fluxing gravel; lump ceramic ground fluorspar; acid grades of fluorspar. Gas, natural, not processed or treated further than the processing or treating customarily occurring at or near the well. *Graphite ore and concentrates; flake graphite; graphite fines, lump and chip; graphite powder.* Gypsum, crude, calcined gypsum. *Indium metal. Industrial diamonds. Iridium metal, including ingot and powder.* Iron ore, crude; pig iron. *Kyanite ore and concentrates; kyanite brick.* Lead ore; refined lead bars, ingots and pigs; antimonial lead bars, ingots and pigs. *Limestone; crushed limestone. Magnesite; dead burned magnesite.* Magnesium-bearing minerals, including *brucite; magnesium oxide; magnesium chloride;* metallic magnesium, pigs and ingots. Mercury ore; mercury metal. Manganese ore; ferromanganese, *including spiegeleisen;* silicomanganese. *Mica, crude, handcobbed; block mica; sheet mica, including splittings; wet or dry ground mica. Molybdenum ore and concentrates;* molybdenum oxide; calcium molybdate; ferromolybdenum. *Nickel ore and concentrates; nickel matte; nickel oxide; nickel ingots, cathodes and shot.* Oil, crude, not processed or treated further than the processing or treating customarily occurring at or near the well. *Osmium metal, including ingot and powder. Palladium metal, including ingot and powder.* Phosphate rock; *elemental phosphorus; ferrophosphorus; phosphorus pentoxide and phosphoric acid derived directly by treatment of phosphate rock;* superphosphate. *Platinum ore and concentrates; platinum metal, including ingot and powder. Pumice, lump. Radium bromide; radium sulfate, radium gas. Rhodium metal, including ingot and powder. Ruthenium metal, including ingot and powder.* Salt, rock; *evaporated salt; soda ash, ammonia and electrolytic caustic soda and bicarbonate of soda when derived directly by treatment of brine. Sea shells; oyster shells; clam and reef shells. Selenium metal.* Silver, refined, including bars, shot, powder and grains. Stone, rough dimension. Sulfur, crude. *Sulfuric acid; oleum (other than sulfuric acid or oleum produced from crude sulfur or any other produce having an industrial use).* Standing timber; logs, logs sawed into lengths, and logs with or without bark. *Talc, crude, ground and sawed. Tantalum ore and concentrates; tantalum double fluoride. Tellurium metal. Tin ore and concentrates;* refined pig tin. *Titanium-bearing ores and concentrates, including ilmenite and rutile; titanium oxide; ferrotitanium.* Tungsten ore and concentrates; *sodium tungstate; ferrotungsten; tungsten metal, including powder; tungstic oxide. Uranium ores and concentrates; uranium oxide.* Vanadium ores and concentrates; *sodium vanadate;* vanadium pentoxide; ferrovanadium. *Whiting; chalk lump. Zinc ores and concentrates;* zinc anodes, *bars,* oxide, powder and slabs. *Zirconium ores and concentrates.*

This new list applies to fiscal years ending after June 30, 1943.

Monetary Conference

The basic principles for an International Monetary Stabilization Fund, reported in last month's issue as agreed upon by the representatives of 34 nations, are now to be the subject matter for discussions at an International Monetary Conference to which the representatives of 42 nations have been invited by the President. July 1 is the date set for this meeting at the Mount Washington Hotel, Bretton Woods, N. H. Plans for the use of gold in the maintaining of exchange stability are expected to play an important part in the effort of the representatives present to consolidate their recommendations for the creation of the $8 billion fund, and the representatives of the Mexican government are expected to insist that the currency stabilization plan be based on both gold and silver. Thus, proposals for international bimetallism will enter the picture although in this respect the attitude of the British participants remains an open question.

Work or Fight

The bill sponsored by Senators Ralph O. Brewster of Maine and Josiah W. Bailey of North Carolina, which would transfer through Selective Service men physically incapable of serving in the armed forces from non-essential to essential work, has received energetic support from the Departments of War and Navy and from WPB Chairman Donald Nelson. These high officials have testified that the bill would cut down the present excessive labor turnover and aid in securing replacements as well as providing a method of checking against a stampede to permanent peacetime jobs. Labor union officials have consistently opposed this bill, as in the case of the Austin-Wadsworth National Service Act.

More recently the Selective Service representative, Col. Francis V. Keesling, has advised the Committee on Military Affairs that as a minimum of control the Tydings amendment to the Selective Service Act should be expanded to require workmen in war essential industries to remain in those industries or else be drafted, as is now provided in the case of agricultural workers. This, he said, would curtail turnover. He also suggested the use of a modification of Senator Wheeler's bill to authorize placement of men 30 and over, regardless of their occupation, at the end of the list in 1-A. This, Keesling said, would be better than exempting them outright and would maintain the incentive to remain in essential work.

Draft Deferments

Under new Selective Service regulations, announced in early May, registrants under 26 will largely meet the induction requirements of the next six months. Registrants 26 through 29 years who can qualify as being "necessary to and regularly engaged in" an essential activity will probably be deferred for at least six months. Men 30 and over who can qualify as "regularly engaged" in essential activities may possibly not be required at all by the armed services.

Under the SSS regulations adjustments of state draft quotas are being made to the end that all states will exhaust their under-26 registrants at about the same time. Until then the only men over 26 to be taken are volunteers, registrants delinquent in reporting to their boards, registrants leaving agricultural employment without board approval, men over 30 not "regularly engaged in" essential activity, and men 26 through 29 who

fail to qualify as "necessary to and regularly engaged in" essential activity.

Employers have been advised that while few occupational deferments are to be granted in the 18 to 25 age range, such registrants may still request deferments on a dependency hardship basis. Dependency hardship deferment requests should be made by letter or direct appeal to local boards. In applying for occupational deferments for men under 26 years of age, SS Form 42-A (Special) is presented by the employer to the State Director and thereafter as quickly as possible filed with the local board. New deferment requests should be submitted by employers for men over 26 (now being reviewed) in the case of each individual not now occupationally deferred; this is the Form 42-A. It is highly important that employers maintain close contact with War Manpower Commission local offices and the U. S. Employment Service, as well as with the offices of local boards and State Directors.

WLB Approves Coal Pact

The War Labor Board on May 19 approved the December 17, 1943, wage agreement between operators representing over 70 percent of the bituminous coal production of the country and the United Mine Workers of America. One week later operators representing practically all of the country's production agreed to go along with the approved wage contract, exception being made by the Southern Coal Producers Association that its members are prepared to pay the approved mine wage scale to the extent that this may be done without endangering pending portal-to-portal litigation. This qualification is in view of the fact that the UMWA has requested Supreme Court review of the Jewell Ridge Coal Company case, in which a Federal District Court in Virginia held that underground travel time in coal mines is not working time within the meaning of Wage-Hour law.

The delay in WLB approval was occasioned by the grant of pay in the wage agreement for an assumed 45 minutes underground travel time to and from work. The final report of the President's Committee on Underground Travel Time shows an average of 57.29 minutes consumed on the daily round trip. Discussing its view of the pay for travel time in its approval order, the Board said: "The net effect of this 12 minutes excess of average travel time beyond the assumed 45 minutes is, under the supplemental agreement, to put upon the operators so long, but only so long, as the miners are required to travel that additional time underground the burden of paying for this excess travel time as though it were productive time. This time does not, of course, result in any increase in the day's pay, under the existing portal-to-portal contract, but the loss in productive time is at the expense of the operators. To whatever extent the operators are able to reduce the travel time toward or below the assumed average of 45 minutes they will get under the portal-to-portal contract a corresponding increase of productive working time. Under these circumstances the War Labor Board is convinced that within the period of time covered by this contract travel time can and will be reduced in the bituminous coal mines, to the mutual benefit of the operators and the mine workers and to the eventual benefit of coal consumers."

Deputy Solid Fuels Administrator Charles J. Potter has stated to the representatives of the operators and the miners that the Government will now return the properties to their owners at the earliest possible moment.

Foremen in Unions

Determination of the status of supervisory employes in unions recently became a problem of first magnitude in connection with a strike of 2,750 foremen and supervisors in the important Detroit war industry area, with the result that over 50,000 workmen were idle. Brought to Washington for a straight talk from Chief of Air Forces Gen. H. H. Arnold, officials of the Foremen's Association of America called off the strike.

On page 59 of MCJ's March issue is an account of the National Labor Relations Board's hearings of February 15 at which Secretary Julian D. Conover, of the American Mining Congress, upheld the NLRB's decision of May, 1943, in the Maryland Drydock Company case, which laid down the general policy that foremen and similar supervisors, as representatives of management, are not to be considered as employes for the purpose of forming collective bargaining unions. He summed up his testimony by stating "we submit that this constitutes sound doctrine; it should be maintained and extended to whatever extent necessary to make it clear that supervisory officials are a part of management and are not employes for the purposes of the National Labor Relations Act."

In early May, NLRB rendered a decision adhering to and reaffirming its position in the Maryland Drydock Company case, but at the same time the Board declined to broaden its interpretation to hold that supervisors are not "employes" for any purpose of the Act, or that "a supervisor may be discharged . . . for his union membership and has no recourse under the act." The decision in effect took the position that supervisory personnel occupies a dual status under the National Labor Relations Act, in that they are employes in relationship to the employer but are also employers in their relationship to employes subordinate to them.

The Detroit strike had been caused by the refusal of the War Labor Board to consider the case brought by the Foremen's Association of America until the NLRB had ruled on the status of foremen's unions. This situation and the Montgomery Ward fiasco have prompted the thought in some quarters that NLRB and WLB should be placed under the Department of Labor, where they could be kept working as a team and thereby avoid the lack of unity among the agencies dealing with labor, particularly in the present wartime emergency.

BOOK REVIEW

COAL PREPARATION, *edited by Prof. David R. Mitchell; Howard N. Eavenson, chairman of the Editorial Advisory Board; sponsored by the Seeley W. Mudd Memorial Fund; published by the American Institute of Mining and Metallurgical Engineers.*

This book of over 700 pages has done an excellent job of fulfilling the intention of the committee and the editor to present a book that would appeal primarily to operating men and at the same time adequately show the theory back of the various processes used in coal preparation.

The book brings out the many phases of coal preparation, each phase of which is carefully treated by an author well versed in his particular subject. The 23 chapters list the following headings: Economics of Coal Preparation; Characteristics of Coal and its Associated Impurities; Sampling; Use Specifications for Coal; Screening; Breaking and Crushing; Preparation at the Face; Hand Picking; Principles of Gravity Concentration; Coal Washers of the Classifier Type; Launder Washers; Jigs; Concentrating Tables; Dense-media Processes; Pneumatic Coal Cleaning; Froth Flotation of Coal; Miscellaneous Processes; Slurries, Sludges, Slimes and Water Treatment; Dewatering and Drying; Dedusting and Dust Collection; Treatment of Coal Surfaces; Plant Operation and Control; and Loading.

We believe the coal industry will sincerely appreciate this excellent book prepared as it was under the duress of war activities which claimed so much of the time of the various authors.

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No. 366 Mine Timber Jack. Four sizes: maximum heights, 6′4″, 7′1″, 8′1″ and 8′7″. Capacity 3 tons.

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PERSONALS

Robert W. Hughes, mine superintendent for the past eight years for the Miami Copper Company, has been advanced to the position of general manager, succeeding **Arno S. Winther**, resigned.

He joined the Miami company in 1922 after several years' employment with the Inspiration Consolidated Copper Company, of Inspiration, and was promoted to assistant general manager six months ago when leave of absence was taken by Mr. Winther.

William W. Martin, formerly ventilation supervisor, has been appointed inside foreman at Grassy Island mine, Olyphant Colliery of the Hudson Coal Co., Olyphant, Pa. He succeeds **Alex Frew**, who has retired.

Walter E. Scott, Jr., will continue to be associated with E F G Engineering Works in Pueblo, but will reopen his office in Central City, Colo., for general practice as consulting mining engineer.

Fred H. Haggerson, formerly vice president and director, was elected president of the Union Carbide and Carbon Corp., recently. He succeeds **Benjamin O'Shea**, president since 1941, who now becomes chairman of the Board. Mr. Haggerson has been associated with Union Carbide for 25 years.

The new directors of the Bituminous Coal Institute, who were elected in Washington, D. C., on April 12, met in New York City on May 10 to organize and elect officers for the year 1944-1945.

Fred S. McConnell was elected president; **J. P. Williams, Jr.**, vice president; **R. L. Ireland, Jr.**, treasurer, and **John D. Battle**, secretary. **Harry M. Vawter** was renamed general manager of the Institute to direct its public relations campaign for the industry.

The directors of the Institute decided to rotate the membership of the Policy Committee. **Grant Stauffer** and **J. P. Williams, Jr.**, were elected to serve on the committee for one year; **Ralph E. Jamison** and **James D. Francis** for two years, and **George W. Reed** and **R. L. Ireland, Jr.**, for three years.

J. J. Kaiser, mechanical engineer with the Glen Alden Coal Co., Scranton, Pa., has retired after 37 years in that department.

L. E. Dick, formerly assistant superintendent at the Montreal Mine, Montreal, Mich., is now superintendent of the Vermont Copper Co., Strattford, Vt.

H. V. Brown, president of Brown-Fayro Company, Johnstown, Pa., was elected Chairman of the Manufac-

turers Division of the American Mining Congress at the recent Coal Mine War Conference at Cincinnati.

C. D. Dunning, of Phoenix, Ariz., has succeeded **J. S. Coupal**, resigned, as director of the Arizona Department of Mineral Resources. Coupal has been the department director since its formation five years ago. He will enter private practice as a mining consultant.

S. K. Hissom, Jr., who has been superintendent of Banning Nos. 1 and 2 mines of the Pittsburgh Coal Co., was recently promoted to the position of division superintendent. He has charge of five mines and a central cleaning plant near Houston, Pa.

Frank A. Wardlaw, Jr., manager of International Smelting & Refining Co., has announced the appointment of **Vincent D. Perry** to the position of chief geologist for the company. He succeeds **Tom Lyon**, who has been promoted to assistant general manager. Mr. Perry was formerly with the Anaconda Copper Co., and was chief geologist for Cananea Consolidated Copper Co. in Mexico. More recently he has been chief of raw material exploration for I. S. & R. Co.

The Ohio Coal Association at a recent annual meeting in Cleveland, re-elected its entire staff officers. **R. L. Ireland, Jr.**, of the Hanna Coal Company is president and chairman of the board. **E. H. Davis** of the New York Coal Company is vice president and **Ezra Van Horn** of Cleveland is executive vice president. **E. H. Miller** is secretary-treasurer with **F. H. Bohecker** as his assistant.

H. C. Schulte has been elected president of the Peninsular Copper Co. to succeed the late **Frank J. Kohlhaas.**

Arthur A. Center, metallurgical engineer, was recently appointed head of the Department of Mining and Metallurgical Research at the University of Utah. He is a graduate of the Montana School of Mines and received his doctorate in engineering at Yale University in 1943.

At a meeting of the Board of Directors of Consolidation Coal Company on May 23, 1944, **George H. Love**, formerly Executive Vice President, was elected President with headquarters at 30 Rockefeller Plaza, New York; vice **Malcolm McAvity**, deceased.

O. A. Rockwell, efficiency engineer for the Calumet & Hecla Consolidated Copper Co. at Calumet, Mich., is now in charge of the company's Iroquois No. 1 mine.

The appointment of **C. W. Trust** as Assistant Vice President in Charge of Traffic, U. S. Steel Corporation of Delaware, was announced today by E. G. Plowman, Vice President, Traffic.

In addition to his new assignment, Mr. Trust will continue his duties as General Traffic Manager of Carnegie Illinois Steel Corporation, National Tube Company, American Bridge Company, H. C. Frick Coke Company and U. S. Coal and Coke Company.

James Westwater was recently appointed assistant superintendent of the Cleveland-Cliffs Iron Company's Princeton Iron Mine at Gwinn, Mich. He was formerly with the company's engineering department at Ishpeming.

Edward V. Creagh has been appointed advertising and sales promotion manager of American Chain & Cable Company, Inc., and Associate Companies, Bridgeport, Conn.

One of the organizers and first President of the Western New England Chapter of National Industrial Advertisers Association, Mr. Creagh is now serving as a vice president of the National organization.

W. J. German, general superintendent for Pocahontas Fuel Co., Pocahontas, Va., has left for Washington to report for Army duty. He is an explosives expert and holds the rank of colonel.

The Electric Storage Battery Company, Philadelphia, announces the election, by the Board of Directors of **C. F. Norberg** to the office of Vice President in Charge of Manufacturing and **D. N. Smith** to that of Comptroller.

Ray C. Treasher, who has been field geologist for the Oregon State Department of Geology and Mineral Industries since 1939, resigned recently to become geologist for the Water Resources Division, War Department, Corps of Engineers in the Sacramento District.

Frank W. Earnest, Jr., president of Anthracite Industries, Inc., recently announced that **Dr. Raymond C. Johnson** has been elected vice president in charge of research and as such will

Dr. Raymond C. Johnson

supervise the extensive research program now being carried on at the Anthracite Industries' Laboratory at Primos, Pa. Dr. Johnson succeeds **Dr. H. J. Rose**, who has resigned to become vice president and director of research of Bituminous Coal Research, Inc.

At its annual meeting in New York recently, the Board of Directors of the Lead Industries Association was renominated and reelected with **John H. Schaefer**, vice president of the Ethyl Corporation, added.

The directors reelected were: **B. N. Zimmer**, vice president of the American Metal Company, Ltd.; **F. H. Brownell**, chairman of the board of American Smelting and Refining Company; **Clarence Glass**, vice president of Anaconda Sales Company; **S. A. Easton**, president of Bunker Hill and Sullivan Mining and Concentrating Company; **A. E. Bendelari**, Eagle Picher Lead Company; **E. L. Newhouse, Jr.**, president of the Federated Metals Division of American Smelting and Refining Company; **L. E. Hanley**, president of Hecla Mining Company; **P. E. Sprague**, vice president of the Glidden Company; **F. W. Rockwell**, president of National Lead Company; **O. N. Friendly**, vice president of Park Utah Consolidated Mines Company; **Clinton H. Crane**, president, St. Joseph Lead Company; **James Ivers**, vice president, Silver King Coalition Mines Company; **J. W. Wade**, president, Tintic Standard Mining Company; **F. F. Colcord**, vice president, U. S. Smelting, Refining and Mining Company.

The executive committee is composed of: **C. H. Crane, F. H. Brownell, F. F. Colcord, L. E. Hanley, F. W. Rockwell.** Officers are: **Crane**, president; **Brownell** and **Rockwell**, vice presidents; **Felix E. Wormser**, secretary-treasurer.

Walter Jaap, who has been mine inspector for the Pittsburgh Coal Co., was recently promoted to the position of superintendent at Midland mine, Houston, Pa.

Col. Robert P. Koenig, president, on leave, of Ayrshire Patoka Collieries Corporation, Indianapolis, Ind., who has returned to the United States on a special mission after more than a year with the Allied Military Headquarters in Naples, Italy, recently was promoted from lieutenant colonel to colonel.

He holds his rank in the Corps of Engineers, U. S. Army, but is on loan

to the Allied Military Control Commission and heads its mining division. In this capacity he is in complete charge for the Allied Military Forces of all mining operations in occupied countries. This covers coal mines, sulphur mines and various other types of mineral properties. During recent months, Colonel Koenig was featured in a number of special dispatches by foreign correspondents and as a result has earned the title of "The Army's Coal Miner."

Major Maurice B. Bradley has returned to the Sales Department of Robins Conveyors, Inc., after an absence of two years during which he served in the anti-aircraft artillery branch of the U. S. Army. Having completed the work which called him into active service, he has been returned to inactive duty.

Newell G. Alford withdrew from the partnership of Eavenson, Alford & Auchmuty May 15, 1944. Business will be continued under the name of Eavenson & Auchmuty.

Walter P. Arnold, technical director of Koppers Company, Wood Preserving Division, was elected president

of the American Wood-Preserves' Association at its 40th annual meeting in Chicago, April 26.

He had served for the past two years as vice president of the association which numbers over 800 members representing both suppliers and users of treated timber including railroads, public utilities, government agencies, marine firms and industrial and building contractors.

— *Obituaries* —

Julian N. Kuntz, 58, died April 18 at Nashwauk, Minn. He was mechanical engineer for the Wisconsin Steel iron mine of the International Harvester Co. He promoted and aided the improvement of iron ore beneficiation both in concentrator plants and sintering plants.

William Symons, Sr., 80, died April 19 at Duluth. He was a veteran of early Lake Superior mining operations and was for many years superintendent of construction for the Oliver Iron Mining Co.

George Dunn, 82, son of Jack Dunn, who staked out the first claim in the rich Warren district near Bisbee, and an operator in the Huachuca area, died on April 22.

Charles D. Skillings, 82, died May 18 at Duluth, Minn. He started the present *Skillings Mining Review*, published in Duluth in 1912, and has been active as editor for 33 years.

John A. Monroe, 69, died May 10 at Iron River, Mich. He was formerly superintendent of the Wauseca iron mine of the Mineral Mining Co.

Alfred M. Ogle, 61, president of the Indiana Gas & Chemical Corporation, Terre Haute, and past president of the National Coal Association, died in Washington, D. C., on May 5.

Tri-State Zinc Mine in Wartime

(*Continued from page* 55)

installed in the shaft to assist in the unwatering operation. Five days were required to unwater the shaft.

The water in this shaft also failed to drain completely to the pump hole, but if the Pomona pump were shut down the sump pumps would not handle the inflow. After the sump pumps reached their effective depths, several methods were tried to help boost the water out of the shaft, as the pump hole was too far from the shaft to drill drain holes as had been done at the Henckel No. 1 shaft. The most effective method was the installation of a ⅜-in. air jet in the discharge line of the sump pump. By this means the sump pumps were effective in handling the water to the bottom of the shaft (133 ft.).

At 98 ft. a clay-filled opening, which at first was thought to be an old drift from former mining operations, was encountered in the northeast corner of the shaft. Instead, this proved to be a clay-filled cavern which widened as the shaft progressed until it covered the entire east and north walls of the shaft and extended an unknown distance to the northeast. The mud ran into the shaft and several days were required to clean it out before the cribbing could be caught up. It was necessary to line the back side of the cribbing with bales of hay to keep the mud from coming into the shaft through the cracks between the cribbing. It required 30 days to sink the last 35 ft. of shaft. Up to the time the shaft was abandoned late in October, 1943, the cribbing showed no signs of twisting or taking weight. If the shaft had been located 10 ft. south it probably would have missed all the clay openings.

After completing the shaft it was necessary to drive almost 100 ft. of drift to the east before the sulphide ore was encountered. As stated earlier, the zinc sulphide was very spotted and erratic, and the mine proved to be unprofitable and was abandoned.

(*Part II will follow in July.*)

Mica

(*Continued from page* 60)

Hard.....Hardness usually ranges between 2.1 and 2.5 on Mohs' scale; used here to mean solid, unweathered, and elastic.

Knife- or sickle-trimmed block..All imperfections removed may be rectangular, circular, or irregular in shape. One side should be beveled to facilitate further splitting. In circular sickle trim no large reentrant angles ("rabbit ears") should be present.

Mica.....Group of complex silicate minerals of variable chemical composition; common characteristic of all is their highly developed cleavage. Muscovite, phlogopite, and biotite are the commonest varities. This paper is concerned principally with muscovite.

Part-trimmed block.....May contain minor imperfections, cracks, or punctures near the edges.

Partial films.....Films of smaller area than the block from which they are split.

Power factor.....Measure of loss of electrical energy in a condenser or capacitor. Condensers store electrical energy for an instant, then return it to the circuit, the loss of energy being the measure of its power factor. Power factors should be 0.02 to 0.04 percent for condensers.

Punch.....Mica having usable area less than 1½ by 2 in. A collective term, including small punch, washer, disk, and punch.

Scrap mica.....Mica so irregular in size and quality that it is suitable for grinding only. It may be (1) run-of-the-mine scrap, (2) factory scrap, (3) punch scrap.

Sheet.....Cut or manufactured mica.

Structural imperfections..Mechanical defects caused by pressure during or subsequent to formation of crystals or intergrowths of crystals.

A.....A series of rulings or striations intersecting at about 60 degrees.

Cracks.....Irregular separations within a crystal that may arise from blasting, rough handling, or natural causes.

Cross grains..Breaks or tears in splitting that produce only partial films. Sometimes an intergrowth of two crystals.

Hairlines.....Irregular imperfections that are not noticeable until split into films; they cause tearing and production of partial films.

Herringbone..Numerous rulings that intersect to form a series of V's, the legs making angles of 120 degrees and joining at the apex to produce herringbone, horsetail, or feather structure.

Reeves.....North Carolina's term for cross-grained.

Ribboned.....Mica that splits into ribbons or long narrow strips because of parallel rulings.

Ribs.....Waves or ridges in the crystal sheets.

Ruled.....Containing planes of separation in addition to and at various angles to the cleavage plane.

Tangle sheet..Sheets that split well in places but tear in others, producing a large percentage of partial films. Sometimes the term is applied to intergrowth of sheets.

Wedge.....Mica that, when split, yields sheets thicker on one end than on the other.

Thumb-trimmed block.....Major imperfections removed; outside edges may contain mineral-stained areas, cracks, reeves, and imperfections.

Diamond Drilling

(*Continued from page* 63)

been used and found in some instances to give lower cost per foot. Lower quality stones chip and break rather than polish, thereby presenting new, sharp edges to the rock, and the bit continues to cut until the diamonds are more or less worn out.

Type of Matrix—It is recognized that hardness is not the only measure of resistance to abrasion and that softer, tougher materials may be much superior in this respect. The two types of mechanically set bits, cast and sintered, differ widely in the characteristics of the matrix used. That of the cast bit is usually more brittle, whereas the matrix of the sintered bit is tougher and more abrasion-resistant. The cast bit is free-cutting and often preferred for average conditions, while the sintered bit gives better results in hard, broken ground.

Waterways—Removal of cuttings and cooling of the bit is more effective if there are no waterways, as water is then forced out evenly all around the face of the bit, and this type is often satisfactory. However, with high drilling speeds it is usually safer to furnish bits with waterways.

Additional footage can usually be obtained from a bit by running it in soft ground after it has polished and stopped cutting in hard ground.

Depth of Blast Hole—The cost per foot does not increase with long diamond drill holes. No absolute figures can be given for the cost per foot, as they vary widely with conditions. The setting-up cost for drills runs up the cost for short holes. There is, in addition, an extra cost due to disproportionate diamond loss in starting the hole.

The diamond drill is particularly adopted for blast holes deeper than 17 to 18 ft. where it can frequently compete with the rock drill on a purely cost-per-foot basis. It has been claimed that the drilling of the first inch with a diamond drill costs as much as drilling the following 20 ft. If a special bit could be developed for the starting of holes, it would help materially to lower the cost of drilling short holes. Any improvements that reduce the "setting-up" time and permit several holes to be drilled from one set-up would also tend to make the diamond drill more useful.

Coal Mining in Two Wars

(*Continued from page* 65)

This result bears some relationship to the problem of bureaucratic interference which the coal mining industry faces in common with other industries. The only hope for relief and, in fact, the only hope for the preservation of our free enterprise system, is the registering of the will of an enlightened electorate at the ballot box, and I ask what you as business men are doing to bring about this enlightenment.

Eastern States

Coal Mission to Britain

THE Combined Production and Resources Board is sending a coal mission to Great Britain composed of technical and economic experts to confer with its London Coal Committee and the Combined Raw Materials Board, British government officials and mining engineers.

The mission's objective is to study and report on: (a) Several technical aspects of both underground and strip mining in the United Kingdom, (b) measures taken by the British Government to control the distribution of coal and conserve its use, and (c) methods used in the compilation of coal statistics.

One engineering matter to be dealt with is the development of strip mining or "open-cast" mining, as it is called in England, for which some machinery is being sent from the United States. It is felt that a study of conditions at the stripping sites should prove extremely helpful. This study would also reveal the extent of further needs for machinery and possibly for additional managerial and technical assistance. It is felt that an examination of the position as to strip mining on the spot by American engineers will be extremely helpful since the maximum production of coal from every source open to the United Nations is of vital concern.

In addition, members of the mission will study and report ad interim to British authorities, and on their return, to the coal committee, on the conditions relative to the possible further mechanization of the underground mines in the United Kingdom.

The members of the mission are as follows: Arthur S. Knoizen, chairman, director, Mining Division, War Production Board; R. O. Rogers, secretary, economist, Combined Coal Committee, Combined Production and Resources Board; George Lamb, assistant director, U. S. Bureau of Mines; T. G. Gerow, Truax-Traer Coal Company, 8 South Michigan Avenue, Chicago, Ill.; W. F. Hahman, Solid Fuels Administration for War; Richard H. Swallow, chief engineer, Ayrshire Patoka Colliery Corporation, Indianapolis, Ind.; Paul Weir, consulting engineer, Bell Building, Chicago, Ill.; Carl Hayden, vice president, Sahara Coal Company, 59 East Van Buren Street, Chicago, Ill., and R. G. Lazelle, mining engineer, Island Creek Coal Company, Holden, W. Va.

Numerous studies in addition to those mentioned will be made to facilitate meeting the coal requirements of the United Nations.

—■—

PENNSYLVANIA

»»» Construction details for a standard-type mine door frame and interchangeable mine ventilating doors, used with considerable efficiency in anthracite collieries of a Pennsylvania mining company, are contained in a Bureau of Mines information circular just released, Dr. R. R. Sayers, Bureau Director, announced.

Although the Bureau's Coal Mine Inspection Division discourages widespread use of ventilating doors, except under certain conditions, doors often are required to facilitate ventilation, and the doors and frames must be so constructed as to curb leakage of air.

The ventilating doors and door frames described in the Bureau's publication are built substantially of readily available low-cost materials and are constructed so that the doors are readily interchangeable and can be rehung quickly if the direction of the air current is to be reversed. When used in pairs to form an airlock, the installations reduce air leakage to a minimum, tests disclosed. The publication contains drawings showing the elevation, plan view, and details for building the door and door frame.

A copy of the publication, Information Circular 7280, "Standardized Construction of Mine Ventilating Doors," by J. C. Hartley and A. C. Moschetti, Federal coal mine inspectors, may be obtained by writing the Bureau of Mines, Department of the Interior, Washington 25, D. C.

»»» Charges of violating the Kohler Mine Cave Law under which Louis Consagra, Blakely coal operator, was indicted, were dismissed recently in an opinion handed down by Judge Will Leach of Lackawanna County.

»»» New regulations assure retail coal dealers a fair share of anthracite coal during the 1944-1945 coal year which began April 1. Producers and wholesalers were ordered to spread their anthracite supply among the dealers they serve, with no dealer getting more than 90 percent of the amount he received in the 1942-1943 coal year, as adjusted to reflect population changes and other new fuel factors.

»»» During May, much tonnage was lost in the Shamokin area when bootleg pickets prevented the operation of the Philadelphia and Reading Coal and Iron Company's strippings. The picketing was in protest against an order by the Northumberland County Court restraining the operation of bootleg mining.

»»» E. B. Winning, associated with Republic Steel Corporation for over 26 years, has been appointed as-

sistant to C. M. White, vice president in charge of operations of the corporation.

Mr. Winning will supervise all of Republic's mining operations. He has been manager of the company's Northern coal mines since 1933. His new headquarters will be in Cleveland.

J. L. Hamilton, who has been serving as assistant, succeeds Mr. Winning in the district offices.

»»» It is reported that a coal tract of 1,200 acres was recently sold to the Cleveland Cliffs Coal Co., operators of the Mather collieries, by the Youghiogheny & Ohio Coal Co.

The Mather collieries now have more than 3,000 acres of coal and at current rate of production this is sufficient to keep the mine in full operation for about 35 years.

The section of land comprises some 30 tracts of land in the Homeville portion of Jefferson township and is known as the Pittsburgh or River Vein of coal.

The Mather mine, employing 600, has been operating since the last war and was one of the first major mining developments in Greene County. Currently it is supplying coal for the Great Lakes trade.

»»» The Lucerne operation of the Rochester & Pittsburgh Coal Company attained the best accident-prevention record of Group No. 1 mines of the Indiana Council of the Joseph A. Holmes Safety Association during the first four months of 1944.

The other highest-ranking operations in Group No. 1 are listed as follows in the order in which they placed:

Ernest mine, Clymer, Sagamore, NuMine and Kent 1 and 2.

In Group 2 mines, Commodore of the New York Central rated first. Others follow—Kent 4, Dayton mine, Waterman 2, and Barr Slope.

»»» The semi-annual meeting of the American Society of Mechanical Engineers will be held at the William Penn Hotel, Pittsburgh, Pa., on June 19 to 22, inclusive. An excellent program has been arranged.

New BCR Director of Research

BITUMINOUS Coal Research, Inc., has announced the election of Dr. H. J. Rose, of Mellon Institute, Pittsburgh, as vice president and director of research in charge of the expanded investigational and developmental program of the bituminous coal industry. This organization of coal operators, associations, and railroads in the Appalachian and Mid-Continent coal fields is enlarging its research projects on coal production and utilization to meet war-time problems and to prepare for and strengthen the industry's post-war position. More than $2,000,000 will be invested in this research program during the next five years.

Dr. Rose has had extensive experience in the technical and administrative phases of coal research. Starting with the Koppers Company in 1918, he became assistant director of research of that organization. He has been with the anthracite industry since 1932, and is resigning as vice president in charge of research, of Anthracite Industries, Inc., New York, N. Y., to accept the new position. In assuming direction of the broader domain of bituminous coal research, he is returning to his original field of activity. He has been associated with Mellon Institute throughout his professional career.

WEST VIRGINIA

»»» The thirty-second annual short course in coal mining will be held at the School of Mines at West Virginia University, Morgantown, at Mt. Hope High School, Mt. Hope, and Welch High School, Welch.

There will be a six weeks' course of study devoted to the technical phases and principles of modern coal mining. The session will extend from June 5 to July 15.

The short courses in coal mining have a particular function this year in assisting to some degree in meeting the unprecedented demand for qualified supervisory personnel in the coal mining industry. At the close of the short course, the West Virginia Department of Mines will conduct special

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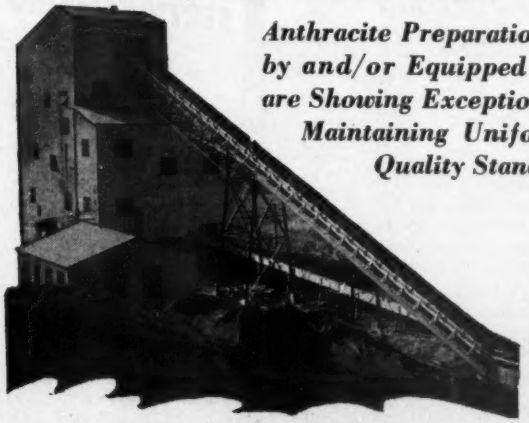

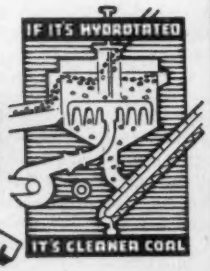

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New Map of District 7

An up-to-date map of the Southern Smokeless or Low Volatile District is now available for general distribution, by W. C. MacQuown, showing the location of each mine, and outline of sub-districts, with indices.

Features shown are: (1) Mines are located by name on the map and not numbers, in relation to state, county, city, railroads and sub-district, including index numbers and freight origin group numbers. (2) Two indices are included, "Alphabetical List of Operators," showing map location of Mines, name or names of mine or mines, location (city, county, state, railroad and sub-district) and seam; "Alphabetical List of Mines" showing map location, operator, index number and freight origin group number. Data was furnished by originating railroads, state and Federal departments, associations and from direct contact with operators and their sales agents. It has been carefully checked to insure authenticity and data is up-to-date.

VIRGINIA

»»» Domestic consumers and coal dealers in Virginia must cooperate closely to counteract by conservation a 10 percent reduction in domestic bituminous coal supplies which looms ahead, William F. Hahman, of Washington, D. C., chief of the Solid Fuels Administration's Bituminous Distribution Division, declared in an address at Richmond recently. He expressed confidence that "the intelligence and patriotic spirit both of coal dealers and of the consuming public" would meet the test which the next heating season will bring.

It will not be enough that coal merchants and the Government merely reduce the use of domestic coal by 10 percent. "Users of coal have a right," he declared, "to know in advance that their supply will be less, so that they can plan accordingly. And, in a democracy, they have a right to know why they can't have more coal." The coals produced in the Southern Appalachian field, besides being extremely popular for household use, have the coking qualities needed for making steel, and therefore, are greatly in demand for all industrial uses. "Before all else, the steel industry must be supplied."

More than 1,000,000 tons of additional low volatile, District 7 coal will be required by the steel industry next year. Approximately 68,000,000 tons will be required from District 7 plus 124,000,000 tons from District 8, making total requirements of 192,000,000 tons for the two districts. But best estimates, Mr. Hahman added, indicated that the two districts "will do well if they produce 184,000,000 tons, leaving a shortage of at least 8,000,000 tons."

NORTH CAROLINA

»»» Drilling for iron ore tests in the Reinhardt furnace section has been going on since November under auspices of the U. S. Bureau of Mines, following a mineral survey conducted for the state by H. A. Brassert of New York. Austin R. Clayton, mining engineer of Lincolnton, said the ores secured from various tests are being prepared for shipment to the College Park, Md., laboratory. If the analysis proves successful, he says, drilling will be resumed in July; but if the assays are unfavorable it is understood that drilling probably will be suspended.

ALABAMA

»»» Coal production in the State for the first three months of 1944 shows an increase of 4.84 percent over the same period for last year, according to a report from James A. Downey, Jr., regional director for the War Manpower Commission. Mr. Downey said that the gain indicates that the miners in this area have responded to the appeals of WMC labor-management committee, to reduce absenteeism and accept a greater responsibility for capacity production. "Not only are the miners of Alabama mining more coal this year," * * * "but they are mining it more safely." Alabama State Mine Department figures show safety efficiency as 28 percent above that of the corresponding period of last year.

»»» Republic Steel Corporation's No. 2 blast furnace, at Birmingham, has been taken out of production for rebuilding, "from the ground up," officials of the company say. The furnace, which has a capacity of about 600 tons, has been in continuous production for several years. It is expected to be back in operation within the next 90 days.

This furnace is one of four blast furnaces operated by the Republic Company—there are two at Birmingham and two at Gadsden. The blowing out of this furnace left 19 of Alabama's blast furnaces in operation. The Tennessee Coal Iron & Railroad Company's Holt furnace was taken out of production, indefinitely, several months ago. There are 21 blast furnaces in Alabama.

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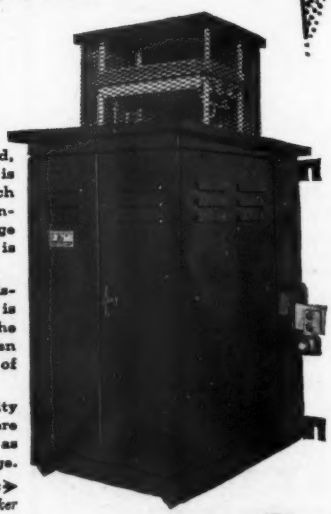

When a mine is sectionalized, an electrical disturbance is confined to the area in which it starts. Operation of mining, loading and haulage equipment in other areas is never penalized.

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Central States

ILLINOIS

»»» The annual summer meeting and boat trip of the Illinois Mining Institute scheduled for June 9-11 aboard the steamer Golden Eagle from St. Louis has been cancelled. The officers of the Institute have expressed the hope that the Golden Eagle, now laid up for repairs, will be in operating condition so that the river trips may be resumed in 1945.

»»» The Chicago and Harrisburg Coal Co. is reported to have acquired the coal land and mineral rights of the Peabody Coal Co. in Vermilion County.

»»» The development of a new slope mine in the No. 5 vein six miles west of Harrisburg has been started by the Bankston Creek Colliery Co. Paul Halbersleben, superintendent of Bankston Creek Colliery Co., reports that the new operation will be put in production within six months if wartime demands for coal makes this expansion necessary. The new operation will be known as Bankston Creek Colliery No. 7.

»»» The Engineering Experiment Station of the University of Illinois, at Urbana, offers two very interesting bulletins pertinent to the present fuel conservation program: "Fuel Savings Resulting from Closing of Rooms and from Use of a Fireplace," and "Performance of a Hot Water Heating System in the Research Home." The second paper is a 72-page report of an investigation conducted by the Engineering Experiment Station in cooperation with the Institute of Boiler and Radiator Manufacturers. The reader is also referred to information circulars of the Bureau of Mines, U. S. Department of Interior; No. 7229 "How to Save Fuel at Home" and No. 7235 "The Storage of Coal."

OHIO

»»» A group of executives of the M. A. Hanna Company, of Cleveland, the Consolidation Coal Co. of Fairmont, W. Va., the Union Collieries of Pittsburgh and other subsidiary concerns recently made a two-day inspection of the Hanna Company mines in the Tri-County district. The inspection represented an effort to correlate the most effective means of proving, perfecting and planning for coal's future. Similar inspections have been made in other districts of the country. Important information was gathered to assure the fulfillment by the coal mines of the great industrial needs in the years to come.

»»» Mayor James A. Rhodes of Columbus has announced a smoke abatement program "to be accomplished through a system of education and example" and not by invoking penalties under present laws. He has appointed a Smoke Abatement Commission of six persons as well as an Advisory Committee. Members of the new Commission are: Ralph A. Sherman (research), superintendent of fuels department, Battelle Memorial Institute; R. F. Stilwell, combustion engineer, Red Jacket Coal Co. (wholesale producers); Henry Wilhelm, business agent, Stationary Engineers and Firemen, American Federation of Labor; Professor Paul Bucher, Engineering Department, Ohio State University; J. M. Jackson, president, Columbus Retail Coal Merchants Association (retail distributors), and Miss Mary B. Crowe, prominent in business and club activities. The Advisory Committee are: Homer Faust, combustion engineer, New York Coal Co.; Dan H. Vogel, combustion engineer, Columbus and Southern Ohio Electric Co.; L. R. Tansley, White Castle System, and H. E. Keefer, retail coal industry.

INDIANA

»»» The Indiana Coal Producers Association has announced its new slate of officers: R. H. Sherwood has been reelected president. He is president of Central Indiana Coal Co., Indianapolis. The new vice president is Fred S. McConnell of Cleveland, secretary-treasurer is Michael Scollard, and executive board members are J. B. F. Melville, Danville, Ill.; Hugh B. Lee, Terre Haute; and H. S. Richards, Boonville.

TEXAS

»»» The Sheffield Steel Company is shipping iron ore from the South Basin iron ore field at Jacksonville and the North Basin ore field at Linden to its new blast furnace plant at Houston. The ore receives a simple wet concentration before shipment. The mills at the two locations have a combined rated capacity of 1,500 tons per day.

MICHIGAN

»»» Diamond drilling is being done at the Breen iron mine at Waucedah, about 4 miles southeast of Loretto, for the Mineral Mining Company, fee owner. The Breen was the

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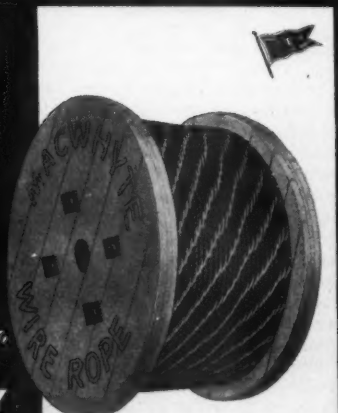

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first mine to ship ore from the Menominee Iron Range in 1877 and has been idle since 1906.

»»» The discovery of iron ore on the present site of Negaunee 100 years ago is to be commemorated during the period June 1 to October 1 with exhibits on display for the entire four months. There will be a large interesting exhibit and trails throughout the pits whereby the mining industry can be viewed first hand, will be open. A centennial pageant will be held in the city of Negaunee on July 4. Chairman for the commemoration is Alvin C. Hampton.

»»» The Antrim Iron Company has sold its blast furnace, retort, chemical plant, boiler plant, etc., at Antrim, to Henry and Harry Carnick who are now dismantling these installations. Antrim has produced Lake Superior charcoal pig iron, wood chemicals and lumber since 1886. Its saw mill will continue using the remaining stand of virgin timber until cutting is complete. This decision was due to manpower shortage in the woods.

MINNESOTA

»»» The Layne-Western Company, drilling a 36-in. diameter borehole for Pickands Mather & Co. at the Bennett iron mine at Keewatin, reports completion of the hole through the surface into the iron formation. The hole is being drilled from surface near the site of the No. 3 shaft for the purpose of drainage and ventilation of the underground workings.

ARKANSAS

»»» The new mill of the Big Hurricane mine in the northern Arkansas zinc district is now nearing completion. It will be watched with interest by other operators in the area because of the number of interesting new features said to be embodied in the plant. The S. &. G. Zinc Mining Corp. is operator of the property with J. Tom Grimmet of Oklahoma City, president, and J. C. Shepherd of Harrison, Ark., manager of operations. Considerable preparatory work has been done on the property including exploration by the Bureau of Mines to delimit ore deposits.

Fairly large tonnages of zinc carbonate, zinc silicate, and jack are present. It is now planned to conduct operations with contractors' equipment, including bulldozer for stripping and a drag line to move the crude ore. Mr. Shepherd is a veteran operator in the district who conducted operations at the Big Hurricane mine during World War I with excellent results.

TRI-STATE

Carl A. Sigler of the Eagle Picher Mining & Smelting Company's personnel offices at Cardin, recently listed the following departmental foremen on the April Safety honor roll:

Mines—Fred Brackeen, Netta; L. E. Wetherall, Blue Goose No. 1; J. D. Lawrence, Leopard; B. F. Charlton, See Sah; C. H. Fox, Crystal-Central; S. J. Briscoe, Webber No. 1; M. W. O'Dell, Wilbur; C. R. Burrell, Hum-bah-wat-tah No. 1; J. W. Hunt, John Beaver No. 2; W. P. Starr, West Side No. 2; E. G. Howard, Webber No. 3; W. T. Long, Hum-bah-wat-tah No. 2; H. A. Williams, Murphy and Illinois; L. R. Johnson, West Side No. 1; K. R. Clark, Buffalo; B. A. Paul, Grace Walker Nos. 1 and 2; W. P. McGinnis, Hum-bah-wat-tah No. 3; G. S. Crewse, Big John; J. J. Duree, Blue Goose No. 2; William DeWitt, Goodeagle No. 1; L. L. Marcus, Gordon No. 2, and J. E. Badgett, Goodeagle No. 3.

Mills—O. H. Told, L. J. Cahill and L. E. Smith, American.

Departments—W. J. Haddock, steel shop; Owen Johnson, railroad; J. E. Butterly, machine shop; J. T. Soulen, shaft repair; C. R. Garrett, pump crew; M. B. Skidmore, pulp plant; Walter Jenkins, Carpenters; G. L. Bitticks, power plant, and A. E. Witzansky, motor service.

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PURE

Western States

COLORADO

»»» Rip Van Dam mine, famous old gold property of the Jimtown mining district west of Boulder, has reported the opening of a vein of exceptionally rich sylvanite ore. Dr. C. O. Weiderburg of Springfield, Ill., recently purchased the King Wilhelm and the Badger group which adjoin the Rip Van Dam of which he is the operator. Paul Corey of Boulder is in charge of operations.

»» The Western Non-Metallic Corp., Inc., is maintaining a three-shift schedule in its operations in sheet and ground mica. The grinding plant of the company is located at Pueblo. Sheet mica is prepared at the mine. The firm also purchases mica on the open market. Joseph A. Stanko of Pueblo is president, C. L. Madonna is vice president and manager.

»»» A preliminary report on lead and zinc deposits of part of the Rico dome, Dolores County, Colo., has been prepared by the United States Geological Survey. During the past 65 years the Rico mining district has produced gold, silver, lead, zinc, and copper having a total value of about $22,500,000. At present, the chief interest is in the deposits of lead and zinc, both of which are metals urgently needed for war purposes.

The Rico mining district is in the Rico Mountains, in southwestern Colorado. Although the ores occur both in veins and in replacement deposits, the chief production has come from replacement deposits in limestone beds. Recent prospecting and development has centered around the thick Devonian limestone, which shows promise of being a good ore horizon.

»»» The Colorado Fuel and Iron Company has leased the Bulkley coal mine property and has purchased the machinery of the Crested Butte Coal Co. About three quarter-sections of the Bulkley property is as yet unmined and the Colorado Fuel & Iron Co. will enter the property from their present mine south of Crested Butte. Coal will be paid for on a 10 percent royalty basis, it is reported. L. W. Ingles will supervise the new operation.

»»» The development program of the Wilfley Leasing Co. at its property near Kokomo, Colo., designed to block out 20,000 tons of zinc-bearing ore, is about half finished and the work is being continued. Between 50 and 75 tons of ore daily are being mined and milled with recoveries in zinc, lead and gold-silver-iron pyrites. Jack J. Walsh of Denver is president, Charles G. Blaha of Denver is general manager, J. C. J. Young is mine superintendent. Thirty-eight men are employed at the mine.

WYOMING

»»» Wyoming and Utah are currently lagging behind in the production of bituminous coal needed to meet the estimated requirements for the year ending March 31, 1945. The manpower problem, absenteeism and the failure of many domestic consumers to store coal immediately are said to be the three governing factors. In arriving at its estimates for 1944 requirements, the Department of Interior has assigned the following tonnages to Wyoming and Utah for the current year:

	Wyoming	Utah
Railroad fuel ...	8,000,000	1,400,000
Retail yards....	1,100,000	2,750,000
By-products ...	.....	950,000
Indust. and export	970,000	1,515,000
Tidewater	5,000	60,000
Truck coal	175,000	410,000
Coal at mines..	150,000	90,000
	10,400,000	7,175,000

The estimate called for a 1944 increase of 14 percent for Wyoming and 20 percent for Utah. To attain such goal, Wyoming must average 200,000 per week and Utah 138,000 tons.

Enlistments due to confusing draft policies and announcements, together with the indication that Utah's young miners will be inducted, have all contributed to the gravity of the situation.

»»» A preliminary report on the Willow Creek coal area, Lincoln County, Wyo., has been issued by the United States Geological Survey. The report, prepared by David A. Andrews, geologist, has been issued as a single sheet, on which geologic maps, coal sections, and accompanying brief text are printed. The maps consist of both geologic and structure contour maps of the area; the sections show the stratigraphic positions and the thicknesses of the thicker coal beds.

Two coal beds in the area are sufficiently thick, extensive, and accessible to have potential commercial importance. The Willow Creek coal averages 3 ft. in thickness and includes more than 13,300,000 tons of recoverable coal within 2,000 ft. of the surface. Its coking properties have been tested by the Bureau of Mines. The Kemmerer coal averages 4 ft. in thickness where prospected, but its variations in thickness and its extent are incompletely known. In one area there is estimated to be 65,500,000 tons of this coal, more than one-third of which is within 2,000 ft. of the surface.

Copies of the report may be purchased from the Director of the Geological Survey, Washington 25, D. C., at 50 cents each.

NEW MEXICO

»»» New officers of the New Mexico Miners and Prospectors Association were elected at the annual meeting held at Albuquerque April 21-22, as follows: President, Horace Moses, general manager of Chino Mines Division, Kennecott Copper Corporation, Hurley and Santa Rita; first vice president, Carl S. Elayer, Silver City; second vice president, John B. Carman, Questa; treasurer, Richard M. Twiss, Vanadium; secretary, Albert P. Mracek, Central; directors, C. A. Pierce, Carlsbad; Vernon Foy, Albuquerque; T. D. Benjovsky, Socorro; F. O. Davis, Carlsbad.

»»» The United States Mining & Milling Corporation has let a contract for the building of a 300-ton concentration mill six miles south of Socorro to treat manganese ores from two deposits in southwestern New Mexico, President Morgan G. Huntington has announced. Milling operations are scheduled to start by early September.

»»» John B. Kelly, state geologist and director of the New Mexico Bureau of Mines, and Charles Johnson, of the Silver City branch office of the U. S. Bureau of Mines, have worked out a program for investigating iron ore deposits in New Mexico, and an increase of the $30,000—1944 appropriation—to $100,000 in 1945 by the government will be asked. Most of this year's study has been devoted to fluorspar deposits. Iron ore de-

posits will be studied in the Silver City area, and in southern New Mexico. Four fluorspar deposits, including one in the Grants area, two in the Deming area, one near Silver City, and a coking-coal deposit near Carthage, Socorro County, will also be studied.

UTAH

»»» An underground school where clerks, grocers and mountain men of the surrounding country are the students learning to become coal miners has been started in the Carbon County mines, near Price, Utah, as a phase of the nationwide effort of the War Manpower Commission to increase wartime production of fuel.

Approximately 900 mine workers have been trained in the Utah school for miners since it was started, according to reports received by the War Manpower Commission. Classes are conducted in several mines in which sections have been set aside especially for instruction of men. Under this type of "on-the-job" training the student miners receive instruction from skilled miners who have been specially selected as instructors. They are employed by the Utah State Board for Vocational Education. The trainees, paid by the mining companies, are men who have not worked previously in the mines.

Under the Utah plan of training, each mine job is carefully analyzed so that the instructors know exactly what to teach the beginning miners. In addition to manual dexterity in the mining of coal, the trainees are taught safety rules, including the reasons for them, WMC reported.

In addition to training for new miners, training is given men and women who work on the surface. Women, although not permitted to work underground, are being employed and hired for surface jobs such as pickers. Two companies in the Carbon County mines, according to WMC reports, are employing women on the surface. Other mines in the area are expected to follow this example.

Under the Utah plan, training is speeded up so that the learners in a few months are taught skills and related knowledges that will fit them for mine jobs.

»»» Reopening of the old Horn Silver mine, situated in the San Francisco district, Beaver County, Utah, has been started under a lease arrangement with a group of metal producers.

Under the program, the King David shaft will be extended an additional 300 ft. to the 1,000-ft. level and a crosscut of 80 ft. driven to encounter the Horn Silver ore channel. The old No. 1 Horn Silver shaft has been abandoned and all work will be carried on from the King David workings.

MONTANA

»»» It is reported that the Pittsburgh Silver Mining Company, organized by Eugene Keesey of Kellogg, Idaho, and associates will take over the Little Pittsburgh mine from the Nancy Lee Mines, Inc. The new company proposes to drive the Little Pittsburgh tunnel about 700 ft. around an area of swelling ground which formerly gave much trouble. The ore carries values in silver and lead, with some copper, gold, and antimony. Keesey is said to have acquired this mine in 1914.

»»» The Silver Star Chrome Company of Silverstar, Mont., is reported to be mining and milling 70 tons of ore daily. The mine is about four miles southeast of Silverstar. This is said to be the only chrome producer active at the moment in this state. Charles N. Moncure of Silverstar is managing director.

»»» Surface work at the Tourmaline gold mine in the Elkhorn district of Jefferson County near Boulder is now under way according to reports. This is the property of United Mines Company, L. R. Dickason, Butte, president. Wade V. Lewis of Portland, Oreg., is in charge of the operations.

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ARIZONA

»»» Summit Copper Mines, Inc., owned by the Verde Falls Gold Mining Company, has commenced operations on property six miles northwest of Payson, in Gila County, and will ship copper ore to Miami. R. W. Thompson, Payson, is the general manager, and other officers are B. E. Tade of Phoenix, Frank Lockridge of Payson and Henry Costa of Phoenix.

»»» A vein of copper seven to nine ft. wide is reported on the "Big Bug" claim of the Mountain Copper Corporation, five miles east of Mayer in Mohave County. The corporation's "The Minor" mine is shipping nearly 500 tons of ore monthly to the smelter in Clarkdale. A new 220-cu.-ft. compressor and a hoist has been installed at the "Big Bug."

»»» Property of the Brighter Days Mining Company, including the "Samoa" and "Lucky Boy," Mohave County, have been leased to Henry A. Rudkin, New York, N. Y.; and the development program placed under the direction of J. T. MacEvoy.

»»» Articles of incorporation of the Roese Mining Company have been filed with the Arizona Corporation Commission, in Phoenix, the company to operate at Prescott in Yavapai County. Capital stock of the corporation is listed at $100,000, divided into 100,000 shares of the par value of one dollar each. Incorporators are J. H. Roese, Downey, Calif.; R. A. Airheart, Los Angeles, Calif.; and L. F. Wilson, Prescott.

CALIFORNIA

»»» It is reported that Idaho-Maryland Mines Corporation has practically completed plans for establishment of a magnesium production plant in the Grass Valley district. The vast serpentine deposits in this region can be utilized for magnesium production at reasonably low cost. By the use of the Brandenburg process, it is expected that 150 lbs. of magnesium metal per ton of crude may be produced. The initial operation for which priorities have already been acquired will be carried out in a pilot plant with a larger unit to be built later.

»»» The Red Star Gold Mine near Michigan Bluffs has resumed hydraulic mining under the WPB extension of permit. Inadequate water supply has delayed operations several weeks with work now centered partly on virgin deposits developed beyond the old placer workings. Sufficient gravel for several years of profitable work is reported available.

»»» The Newton copper mine near Jackson in Amador County operated by the Winston Copper Company employs a crew of 50 men working three shifts daily. A production of 15 to 17 carloads of copper ore per month is recorded. Wayne Loel, Los Angeles, is president; William O. Maxwell of Los Angeles is vice president; Hal M. Lewers, Plymouth, Calif., is mine superintendent.

IDAHO

»»» Polaris Mining Company, at its annual meeting in Spokane this month, reelected the board of directors, consisting of L. E. Hanley, president and manager; Leo J. Hoban, vice president; Bert P. Woolridge, secretary; J. L. McCarthy and A. W. Witherspoon, directors.

This company recently reconditioned its milling plant to treat zinc-lead tailings and it is estimated the company's net earnings from this operation will amount to around $12,000 a month. The company has practically suspended mining operations in the ground known as "No Man's Land," which has been a highly productive area of rich silver ore, and is confining operations to that part of the rich Chester vein which is being jointly worked on a 50-50 basis with the Sunshine company with the latter doing the mining and milling. Polaris profits from this source during the last six months in 1943 totaled over half a million dollars.

»»» The Coeur d'Alene Mines Corporation has opened its vein in a crosscut on the 2,200-ft. level, showing 7 ft. width of ore averaging 9 to 12 ounces in silver and commercial quantities of copper and antimony.

»»» Bunker Hill & Sullivan M. & C. Company has declared its June dividend for the year 1944. The rate is 12½ cents a share and totals $163,500, payable June 1 to stock of record May 9. This brings the company's dividends for the current year to $327,000 and the grand total to date to $58,914,241.

»»» Bradley Mining Company in the Yellow Pine district of Idaho is now producing 50 percent of the domestic tungsten mined in the United States. The ore is mined by open cut method and in addition to the tungsten, valuable by-products of antimony and gold are recovered. The tungsten deposit was discovered in diamond drill operations by the U. S. Bureau of Mines. At the time of this discovery the Bradley camp of Stibnite consisted of less than 300 people; today the population numbers around 2,000. It is in what is known as Idaho's "primitive area" and the only means of contact with the outside world in winter has been by means of snowshoes or airplane. The discovery of tungsten ore has made a miraculous change. Today the camp is equipped with a 60,000-volt electric power line costing $1,000,000 and the state and government is building a standard highway into the camp.

The Bradley company has been shipping tungsten and antimony concentrates by truck over two high mountain ranges a distance of about 70 miles to the nearest railhead. The tungsten concentrates produced average about 45 percent tungsten. The company is now equipping a processing plant located in Boise to produce a tungstic oxide content of 75 percent, which is required to meet specifications of consumers. This plant will use hydrochloric acid as its main reducing agent, and will produce about 300 tons of tungstic oxide per month. The concentrates will be hauled by truck from the mine to Boise. The company is also experimenting with a smelting process at the mine for the treatment of that portion of the concentrate product containing gold, silver and antimony and plans to erect a smelting plant at Stibnite as soon as a satisfactory treatment process has been perfected.

WASHINGTON

»»» Arthur E. Drucker, metallurgical engineer, dean of the School of Mines and Geology of the State College of Washington, and director of the Mining Experiment Station and State Electro-Metallurgical Research Laboratories, plans to retire from these posts in July of the current year. He has been dean of the School of Mines since November, 1926, and has organized and directed the pioneer research in magnesium and aluminum in the State of Washington, a development coordinated with the Grand Coulee and Bonneville power projects.

»»» One year of diamond drill exploration of the Metaline region of northeastern Washington by U. S. Bureau of Mines' engineers is said to have indicated one of the richest zinc deposits in the West, the extent of which is not yet known. On one zone explored there are indicated deposits of approximately 8,800,000 tons of lead-zinc ore averaging 6 percent metallic content in which zinc predominates two to one over lead. Another deposit drilled in the same area shows 180,000 tons.

Manufacturers Forum

Allen Awarded Medal by Franklin Institute

Frank B. Allen, president of the Allen-Sherman-Hoff Co., Philadelphia, recently was awarded the Edward Longstreth Medal of the Franklin Institute. This honor was bestowed on Mr. Allen for his invention of a "Seal Ring" for use in centrifugal pumps (Hydroseal Pumps) handling abrasive solutions. The actual citation from the Franklin Institute reads as follows: "In consideration of the development of a pump (Hydroseal) which will successfully handle water or liquids, containing abrasive materials, retain its initial efficiency and original discharge for considerable periods, with low maintenance costs and the successful manufacture of this type of pump, giving satisfactory operation in many installations."

Frank B. Allen

Timken in South America

The Timken Roller Bearing Company has organized a subsidiary, the Timken Roller Bearing Company of South America. After the war, under the direction of Jules A. Morland, the new firm will handle engineering development of Timken products in the Latin-American countries.

As part of its organization program, Timken now has two young Brazilian engineers, Murillo Garcia Moreira, 24, of Rio de Janeiro, and Jose Marianno Chaves, 26, of Sao Paulo, in its Canton plant, where they are familiarizing themselves with the engineering production and application of Timken roller bearings and steel. They are later to spend a period of time in the Mt. Vernon plant of the Timken company where rock bits are manufactured.

In describing the move, Whitley B. Moore, Timken general sales manager, said that in the past the company conducted its business there through South American distributors.

"It now seems well to have our own organization there," he said, explaining that the company expects a demand not only for new equipment but also for replacements. He said the company also expects a large railway expansion, a field for the use of roller bearings. There also will be some demand for alloy steel, the sales executive said.

Fiftieth Anniversary for Cleveland Pneumatic Tool

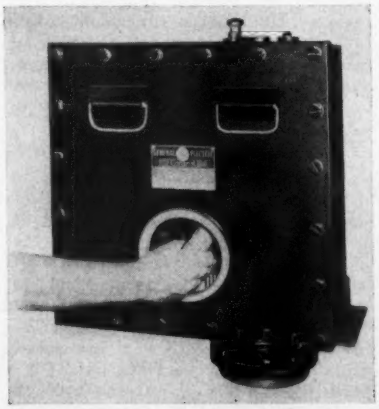
The Cleveland Pneumatic Tool Company of Cleveland, Ohio, is marking its 50th anniversary during the month of June, 1944. Practically all of its peacetime products, which include pneumatic tools, aircraft landing gear, shock absorbers for military rolling stock, rock drills and other mining and construction machinery, are being manufactured for the war effort.

It was incorporated in Ohio on May 29, 1894, as the Union Electric Company for the purpose of manufacturing and selling electric appliances. The company then had 10 employes. In 1908 a wholly owned subsidiary for the manufacture of pneumatic mining and construction tools, the Cleveland Rock Drill Company, was organized.

New Explosion-Proof Starters

A new line of alternating-current, full-voltage explosion-proof starters for use in gaseous mines has been announced by the Industrial Control Division of the General Electric Company. The new starters are especially designed for use on equipment subject to inspection by the United States Bureau of Mines, such as face conveyors, room conveyors, and similar mining equipment.

Available up to 50 h.p. in the reversing type and up to 100 h.p. in the non-reversing type, these starters are housed in heavy, explosion-proof enclosures fabricated of steel plate. In addition, the wide flange between the cover and the body of these enclosures is ground to close tolerances to prevent the escape of burning gases. Access to the line fuses is facilitated by a hand-hole cover equipped with an inspector's seal.

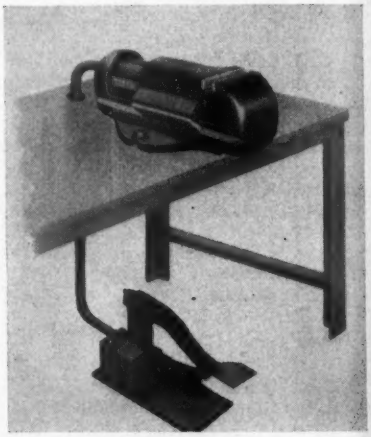


The switches, contactors, and overload relays of these starters are of the heavy-duty type characteristic of such equipment, and are designed and located to permit a considerable variety of magnetic interlocked control arrangements.

The starters are furnished with simply assembled bell-mouthed packing glands to match the size of the cable to be used. If required, a cable retaining clamp is also furnished with each starter.

New Hydraulic Vise

Rugged "V" ways, semi-steel, with precision construction and simplified, all steel hydraulic foot control, are features of the new hydraulic vises manufactured by Reimuller Bros. Company, 9400 Belmont Avenue, Franklin Park, Ill.



The vise can be mounted vertically and used for a production press on small precision upsetting, heading, and other small operations requiring dies or tooling.

Two levers are used in the hydraulic foot-control; one to apply pressure, the other for release, which has a two-speed return. No outside airline or power is needed and the unit is self air eliminating. Operator's hands are free for work.

The new vise is portable in that it is equipped with flexible hydraulic hose which lends adaptability to use on other machines. Two sizes are available; 4-ton with 4-in. opening, and 7-ton with 7-in. opening.

The Army-Navy "E" Award

The Yuba Manufacturing Company, of Benicia, Calif., was recently presented the Army-Navy "E" Production Award at an impressive ceremony presided over by Judge Hartley Russell. Presentation of award was made by Colonel K. B. Harmon, chief, San Francisco Ordnance District, with acceptance for the company by the Honorable Charles W. Slack, senior vice president, Yuba Manufacturing Company.

Commander O. B. Earle, U. S. N. (retired) ordnance officer, office of Industrial manager, Navy Yard, Mare Island, presented the "E" pins. Representing employes were Joseph W. White, president, Benicia Machinist Lodge No. 1687, District Lodge No. 95, I. A. of M. (A. F. of L.), Mrs. Dorothy Hughett, Mrs. Marion Brown, Mr. Andrew W. Robbins, Mr. E. Dean Elshire and Mr. Charles Austin Drew. Mr. Drew made the acceptance for the men and women of Yuba.

Worthington Purchases Electric Machinery Manufacturing Company

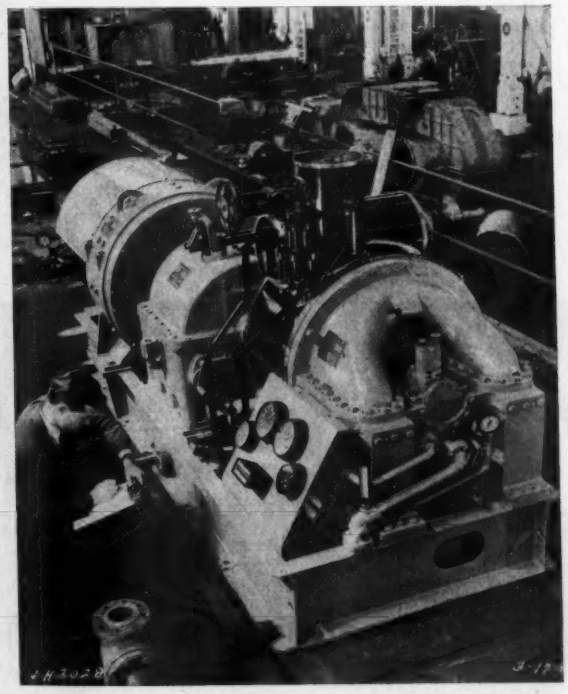
Purchase of Electric Machinery Manufacturing Co., Minneapolis, Minn., by Worthington Pump and Machinery Corp., Harrison, N. J., is announced by Harry C. Beaver, president of Worthington, and Walther H. Feldmann, president of Electric Machinery.

New Turbo-Generator

Built for war service, the new Hendy auxiliary power unit had to meet the exacting requirements of the U. S. Navy and the Maritime Commission Standardized Specifications. Its basic design covers a wide range of output, starting at 250 KW. The modern trend toward simplification has been followed throughout in the design.

The turbine has an economical water rate per kwh, thus insuring low operating cost. It has a large-diameter spindle with disks having large hub sections, assuring great strength. Interstage seals are of the step-cut labyrinth type. The steel Rateau nozzle disks have welded-in, rolled stainless-steel nozzle blades and spacers. The governing system uses anti-friction bearings and has no stuffing boxes or soft packings, assuring accuracy and simplified control. Smoothness and compactness of design have been achieved without sacrifice of accessibility.

The reduction-gear case is of fabricated steel, smoothly finished with rounded corners. Rigidity is combined with light weight in its construction. External piping has been reduced to a minimum. The generator field yoke is formed of rolled steel plate, split on the horizontal centerline with the halves bolted together. It is of shock-proof construction, for greater safety under adverse conditions. Its liberal dimensions provide capacity for emergency overloads, maintaining high efficiency throughout. The shaft bearing is of the sleeve type, mounted in a self-aligning spherical seat, insuring alignment.



A new turbo generator being checked at Hendy works

CATALOGS AND BULLETINS

BATTERY CHARGING. *The Electric Storage Battery Co.*, 19th St. and Allegheny Avenue, Philadelphia 32, Pa. A 16-page bulletin, No. 207, on charging equipment for Exide batteries in motive power service has been issued by the Electric Storage Battery Company. It contains detailed description of the two-rate and the modified constant potential systems of charging with numerous diagrams, graphs, and tables. A copy may be obtained upon request.

BLASTING ACCESSORY. *Hercules Powder Company (Explosive Department)*, Wilmington, Del. Spiralok, the first cartridge with the spiral thread, in seismic exploration and in blasting river crossings for pipe lines, is described in a new booklet, illustrating its advantages.

"COAL-CLEANING DEVICES." *Roberts and Schaefer Company*, 307 N. Michigan Avenue, Chicago. Bulletins 161, 162 and 163 are explanatory of three outstanding coal cleaning processes. Bulletin 161 describes the improved launder-type Hydro-Separator. Bulletin 162 describes the hydrotator, and Bulletin 163 describes the Stump air-flow cleaner. Each is well illustrated with line diagrams and full and cutaway views.

COMPRESSORS AND VACUUM PUMPS. *Ingersoll-Rand Company*, 11 Broadway, New York City. New 32-page catalog, Catalog Form 1502, of compressors and vacuum pumps in sizes from one-half to 10 h.p. Bulletin covers Type "30" line of air-cooled machines with two notable additions, a 3-stage dual-pressure portable and two 3-stage high-pressure units. Six pages of excellent installation views showing various applications. Table of contents is ingeniously arranged in the form of a chart which enables the reader to select the proper compressor for a given pressure and capacity.

ELECTRIC SHOVEL OPERATION. *General Electric Co.*, Schenectady, N. Y. A new bulletin, GEA-4161, contains information on how the G-E amplidyne improves electric-shovel operation.

JACKS. *Templeton, Kenly & Co.*, 1020 S. Central Ave., Chicago 44, Ill. New 60-page catalog and manual of Simplex Lever, Screw and Hydraulic Jacks, No. 44, has just been published and is now available.

Pictures, descriptions, dimensions, capacities and weights of hundreds of jacks in sizes from 3 to 100 tons capacity and approved under Government Limitation Order L-322 are fully detailed in this book.

"PORTABLE TOOLS." *Independent Pneumatic Tool Company*, 600 W. Jackson Blvd., Chicago, Ill. A deluxe brochure has just been released covering the history, development features and specifications of the recently introduced Thor Plastic-Housed Portable Electric Drill. It is a colorful and interesting exposition of the growing application of plastics to many industrial uses.

ROPES. *John A. Roebling's Sons Company*, 640 S. Broad St., Trenton 2, N. J. A 72-page catalog showing various types of slings and giving data on wire rope, grommet slings for both standard and special uses, the new Roebling "Flatweave" Sling, recommends safe loads and size ranges, and various types of wire rope fittings used with slings.

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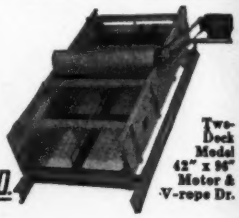

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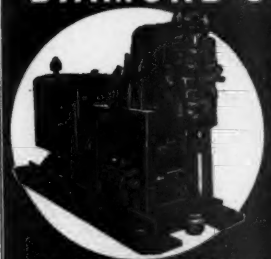

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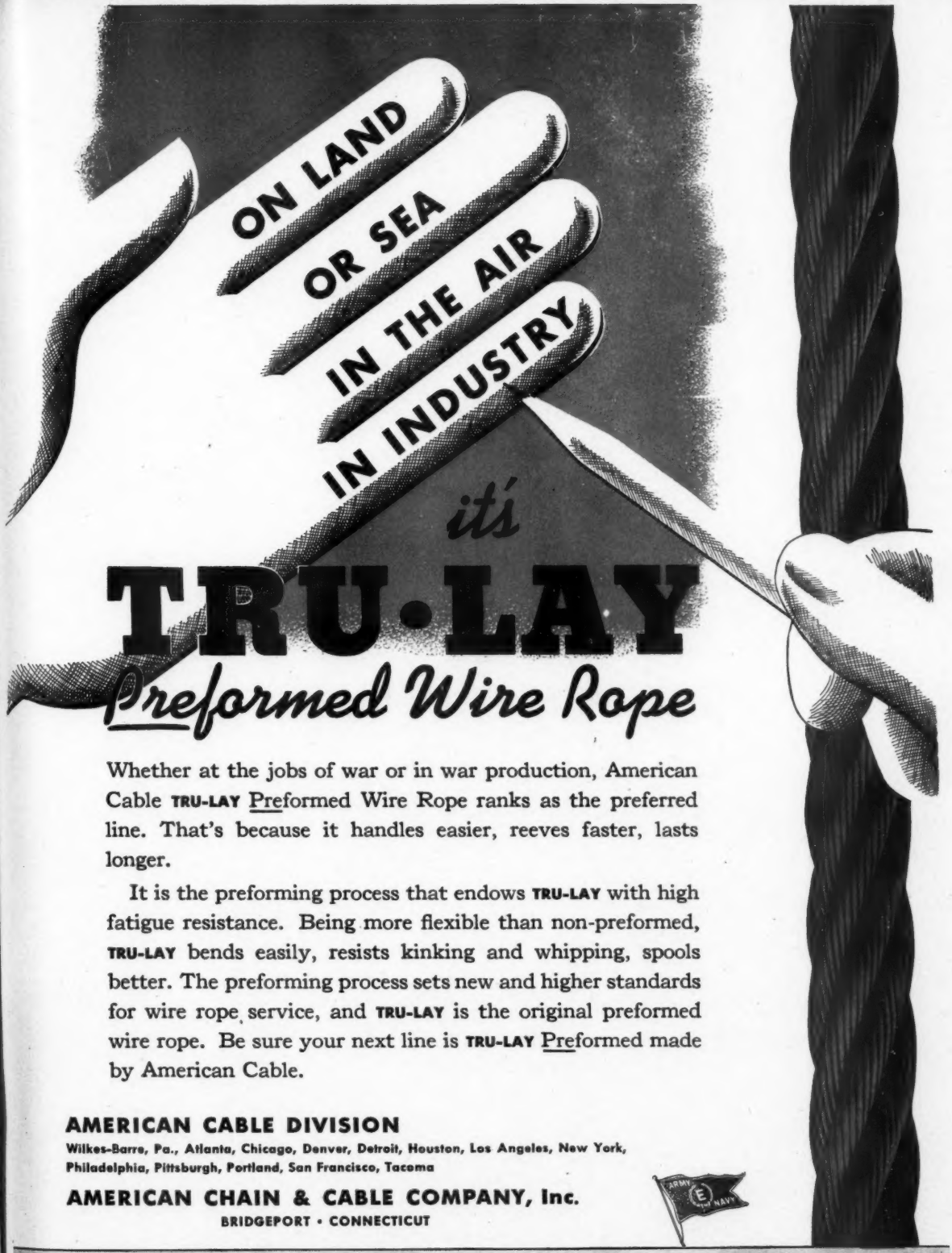

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